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DISEASES OF THE PROSTATE

SIR HENRY THOMPSON

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Walnut Creek
November 17. 1886

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THE

DISEASES OF THE PROSTATE

THEIR

PATHOLOGY AND TREATMENT

COMPRISING THE

Jacksonian Prize Essay for the Year 1860

BY

SIR HENRY THOMPSON

SURGEON EXTRAORDINARY TO HIS MAJESTY THE KING OF THE BELGIANS; CONSULTING SURGEON
AND EMERITUS PROFESSOR OF CLINICAL SURGERY TO UNIVERSITY COLLEGE HOSPITAL
FELLOW OF UNIVERSITY COLLEGE; LATE PROFESSOR OF SURGERY AND
PATHOLOGY TO THE ROYAL COLLEGE OF SURGEONS; HONORARY
CORRESPONDING MEMBER OF THE SOCIÉTÉ DE
CHIRURGIE OF PARIS; ETC.

SIXTH EDITION

PHILADELPHIA
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1886

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1886

PREFACE TO THE SIXTH EDITION.

THE preceding edition having been recently exhausted, I have endeavoured to prepare a new one containing a *résumé* of all that is known of the Prostate and of its diseases at the present date.

Numerous modifications and additions have been necessary, arising in part from enlarged personal experience, and in part from the increased extent of our knowledge generally in relation to this and to kindred subjects.

The sections devoted to the histological study of the Prostate, enlarged by deposits of various kinds, have been shortened; while a new and, it is believed, more accurate classification of them, based on a recent examination of the subject, has been proposed.

Fresh suggestions, the result of increased experience in the treatment of various troubles which arise from enlargement, and especially in advanced cases where judicious operative interference often renders valuable service, have been added.

Finally, a large part of the work has been re-written, with the object of rendering the text throughout more clear and concise.

35 WIMPOLE STREET, CAVENDISH SQUARE:
June 1886.

54079

PREFACE TO THE FIRST EDITION.

Having during the last few years enjoyed considerable opportunities for the study of Prostatic disease, I have aimed at embodying, in the following pages, the observations which a careful and laborious prosecution of it has led me to make. I should not have ventured to do so, had the results altogether coincided with those obtained by previous inquirers. The views here maintained of the Anatomy of the Healthy Prostate, but particularly of the organ in its most common deviation from the normal state, viz. when the subject of senile enlargement, differ materially from those which have been commonly held. The conclusions I have arrived at are based on extended anatomical researches, embracing an examination of not less than seventy original dissections, forming preparations now in my own possession, in addition to such observation of the contents of our metropolitan museums as I have been able to make. The data from which such conclusions were drawn have been appended, so far as it was possible to do so, that the scientific inquirer may form his own opinions respecting them. The points to which I desire especially to request his attention may be briefly stated as follows:—

The assignment of the 'third' or 'middle lobe,' as a separate anatomical portion of the Prostate, to the abnormal history of the organ:—discussed in the first chapter.

The analogy between the enlargements and tumours of the Prostate and those of the Uterus:—discussed in the second chapter.

An examination of the alleged causes of enlargement of the Prostate, resulting in new views of this subject:—in the third chapter.

The effects of enlarged Prostate in relation to the function of micturition:—considered in the fifth chapter.

The researches in relation to Malignant and Tubercular Disease of the Prostate:—in the ninth and tenth chapters.

The consideration of 'the bar at the neck of the bladder:'—in chapter the twelfth.

Besides these, I have treated at length the subject of Diagnosis and Treatment of Enlargement, and of the various complications which arise in connection with it, perhaps, I may venture to say, more fully than any preceding author.

And lastly, I have devoted a chapter to the consideration of that important, but not uncommon complication of enlarged Prostate, stone in the bladder; and especially of the best modes of successfully applying Lithotrity as a means for its removal. I venture to hope that in discussing thus fully the question of Treatment, whether in relation to the simple or the complicated forms of this common complaint, some hints will be found which may prove useful in the various emergencies of practice. I shall feel abundantly rewarded should some of my professional brethren discover any such fruit as the result of my labours.

WIMPOLE STREET, CAVENDISH SQUARE:
November 1857.

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THE

DISEASES OF THE PROSTATE.

PART I.

THE ANATOMY OF THE PROSTATE.

CHAPTER I.

THE TOPOGRAPHICAL AND STRUCTURAL ANATOMY OF THE PROSTATE.

The Prostate as an Independent Organ—Mode of Dissecting—Limits of—Form—Size—Measurements—Weight—External Relations—Vessels and Nerves—Anatomical Conformation; Lobes—History of the 'Third Lobe'—Prostatic Urethra, its Course and Character—The Utricle—Ejaculatory Ducts—MINUTE ANATOMY—Its Fibrous Elements—Its Glandular Elements—Relative Proportions of—Prostate Gland in Young Subjects—Its Weight, Size, and Relations.

IN order to study the Pathology of the Prostate, it is necessary to observe accurately its normal structure, conformation, and anatomical relations. The most common, as well as important, morbid states to which this organ is subject, either consist in, or are associated with, deviations from the natural size and form, as well as from the natural disposition of the structures entering into its composition. It is apparent that its topographical relations must be also deranged when deviation from size in the direction of enlargement becomes considerable, as it not unfrequently does. On the other hand, it is certain that hitherto the normal dimensions of the prostate have not been accurately determined, inasmuch as very different weights and measurements are named in describing it by various authors.[1] I propose, therefore, first to consider its normal anatomy in detail.

In entering on this subject it may be admitted that clearly defined marks are wanting in the structure itself to which the term 'prostate gland' is applied, to indicate with precision its anatomical boundaries, or even to substantiate an undisputed title to its recognition as an independent organ, in that sense in which the word is commonly understood. Forming a small portion of a large and important apparatus, which is continuous in structure throughout, the ante-vesical or 'prostatic' mass nevertheless exhibits peculiar characters in the arrangement and combination of its component tissues; a special appellation may be therefore regarded as appropriate and necessary for anatomical purposes.

---

[1] Date of first edition, 1857.

The view which regards the prostate as a separate organ is also supported by the fact that a glandular body similar to that in man is present as an accessory to other sexual organs throughout a large portion of the animal series, not only in the vertebrate class, but in the invertebrate also. And, lastly, there is the consideration which is supplied by the fact, that the prostate is subject to morbid changes which, as will be seen hereafter, are peculiar to it, and which do not occur in any adjacent or related structure.

These remarks are designed to explain that, although the prostate is not an independent organ like the liver, the kidney, or the pancreas, it has characteristics sufficiently distinctive to substantiate the claim here made.

The name of 'prostate,' as applied to the part under consideration, is supposed to have been originated by anatomists, from the fact of its *standing before*, or anterior to, the bladder or vesiculæ seminales, in the supine position of the subject; its name of 'gland' from the glandular structures which form a considerable part of its component tissues.

The prostate gland of the adult is commonly described as resembling a full-grown chestnut in size and form; sometimes it is compared in the last-named character to the ace of hearts, the small extremity being directed downwards and forwards, and the base upwards and backwards, in the erect position of the body.

When the bladder, prostate, and vesiculæ seminales, as well as the urethra for two or three inches of its course anterior to the prostate, are removed from the body and are fairly isolated from the neighbouring parts by dissection, the prostate appears as a mass having the form of a short truncated cone flattened between its pubic and rectal aspects, the base of which surrounds the neck of the bladder and projects somewhat below it, while its blunted apex ends at the fascial partition which stretches across the angular interval between the pubic bones, and is known as the posterior layer of the deep perineal fascia. The bladder should be slightly distended with tow, and the parts above-named should be properly secured to facilitate the dissection, with the posterior or rectal aspect upward, from which it is understood that the rectum itself has been carefully removed, without removing more of the fascia than is necessary in the operation.

First will be seen the vesiculæ seminales and vasa deferentia bound closely by a dense fascia to the posterior border of the prostate and base of the bladder adjacent, and requiring some careful dissection to isolate them fairly. Each vas deferens has a vesicula seminalis on its outer side, and approaches obliquely the median line as it courses forward to the base of the prostate, and just before entering it joins the vesicular duct to form the common or ejaculatory duct. These two vessels, if carefully cleaned and traced, will be seen to perforate the mass in a deep central interlobular depression or notch, and to enter it in the middle line side by side. A layer of fascia, a portion of the recto-vesical fascia, which forms an enveloping sheath for the gland, may be now dissected from its inferior surface and sides, where several venous sinuses will be encountered, especially along its lateral borders; those vessels being often large and generally filled with coagula, particularly in elderly subjects, sometimes also containing large phlebolithes. The proper capsule, which cannot be regarded as a mere offshoot from any adjacent fascia, but is a special envelope belonging to the prostate itself, although thin, is firm in texture, and defines clearly the form and limits of the prostate here. Proceeding with the dissection by turning upwards a little the peritoneum covering the bladder, and tracing the external layer or longitudinal muscles of that viscus, some bands of the paler and less superficial fibres will be found inserted into the base of the prostate above the point where the ejaculatory ducts enter. These being next divided, and the longitudinal layer turned aside from the base of the bladder to the right and left of the middle line, as well as the mutual interlacements of the different vesical coats permit, the inner or circular layer comes into view. These, which are very pale in colour, should be defined at the base and neck of the bladder, where they are chiefly aggregated, being thin and scattered above, since by tracing them forwards they will be found to be continuous with muscular fibres similarly arranged, and forming a considerable portion of the prostate itself. Next, in order to observe this continuity, the proper capsule must be partially removed, with the superficial and lateral portions of the prostate, which contain a large proportion of granular structure intermingled with interlacing muscular and fibrous tissues, to be described with the minute anatomy of the organ. Into this portion some fibrous prolongations of the capsule proceed, and minute vessels enter the prostatic substance with them. But in order to trace the circular fibres of the bladder through the prostate, a delicate dissection is necessary; and thus it is easy to demonstrate complete continuity of structure between the circular fibres of the bladder and the constituent fibres of the prostate, and that they are arranged around the tube of the urethra in the manner described. They may be traced along that canal, diminishing in volume in the anterior direction, as far as to the bulb of the urethra, where they stop, having extended over the whole of the membranous portion. In this latter situation they form only a layer from one-half to one-third of a line in thickness, although quite distinct. Lastly, if the circular fibres are removed with care, a longitudinal layer of delicate pale muscular fibres is exposed, lying immediately outside the mucous membrane which forms that canal. These are the muscular fibres which surround the urethra throughout great part of its course, and which have been described in somewhat different terms by Hancock, Hogg, and Kölliker.

In order to present a clear view of the order in which the structures constituting the prostate are arranged, and particularly with regard to the urethra, which passes through it, they are here named in the reverse order to that already pursued, viz., from within outwards.

Firstly, the mucous membrane of the urethra.

Secondly, a delicate layer of longitudinally disposed pale or unstriped muscular fibres mingled with a good deal of connective tissue and some elastic fibres, this layer forming part of a system of longitudinal fibres underlying and surrounding in greater or less quantity the whole urethral canal.

Thirdly, a circularly disposed layer of pale or unstriped muscular fibres of considerable thickness posteriorly, where they become continuous with the circular fibres of the bladder, and becoming thinner as they approach the membranous portion, over which they proceed and then terminate. This layer contains also connective and elastic fibres like the preceding.

Fourthly, beyond this lies the greater part of the glandular structure properly so called, which intermingles with, and is supported by, a considerable portion of tissue, composed in part of pale muscular fibre, and in part of connective and fibrous tissues, which, interlacing together, constitute the rest of the organ. It is this composite structure which, disposed in masses chiefly in the lateral direction on either side, gives form and character to the organ.

Fifthly, the enveloping fibrous capsule.

To what precise portion of the mass lying anterior to the bladder and surrounding the urethra, shall we assign the limits of the prostate?

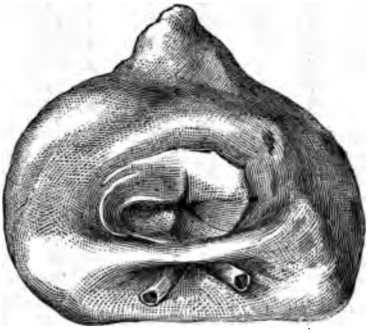
In front the posterior or deep layer of the perineal fascia may well be regarded as the boundary line. Behind we have no such limiting distinction, but we may proceed as follows. Taking a fresh specimen, in which the bladder and prostate have been carefully separated from the adjacent veins and fascia, and in which the vesiculæ seminales and ejaculatory ducts have been separated and traced into the interlobular notch, the basic extremities of the lateral lobes being defined, and division having been also made in front at the perineal fascia, we should lay open the bladder, and, with a pair of scissors, cut away the walls of the bladder closely round the neck or vesical orifice of the urethra. In doing so we shall divide the circular fibres freely, and some of the external longitudinal fibres, as well as the mucous membrane and submucous tissues around the internal meatus, particularly those forming the uvula or luette vésicale: the remaining portion may then be accepted as a fair specimen of the prostate gland in an isolated condition.

It is this mass with which we have to deal in respect of external physical characters.

First, as to form. A slightly truncated cone, flattened antero-posteriorly, short, so that the diameter of the base exceeds by a fourth or fifth the measurement of the longitudinal axis, the base being notched or indented for the entry of ducts.

A drawing representing such a specimen in the supine position, and dissected in the manner described, is presented in fig. 1.

FIG. 1.



A healthy prostate, from a man aged thirty-five years. It was dissected and accurately drawn while in the fresh state. The organ lies with its posterior or rectal surface downwards. The portion contiguous to the bladder is nearest to the eye; the internal meatus being seen above, and the ejaculatory ducts in their depression below.

Observing it more closely, the anterior surface appears generally convex. I have scarcely ever found any trace of a depression in the line of the long axis, said, in anatomical works, to exist and to correspond with the track of the urethra. The posterior or rectal surface is smooth and also rather convex, but here the course of the urethra is denoted by a shallow median depression, while the unyielding masses of the lateral lobes are seen, one on each side, and are still more readily recognised by pressure with the finger; two slight lines of depression are also seen converging at the basic part of this surface, which indicate the tracks of the ejaculatory ducts. At the base are seen the internal meatus of the urethra, and below it the interlobular notch and the funnel-shaped opening by which the ejaculatory ducts enter. It should be observed that the urethra perforates it at a point a little in advance of the base itself, approaching, in fact, to the upper surface, so that the portion of prostate below the urethra exceeds by about one-third or one-fourth the length of the portion which lies above. On each side of the base, the rounded posterior limit of a lateral lobe projects, a little backwards and outwards, leaving a notch between. The projection of a 'median portion,' or 'third lobe,' if present, is seen between the urethral opening and that for the two ejaculatory ducts beneath.

Measurements.—The transverse diameter is almost always the greatest, exceeding the antero-posterior by a fifth or a sixth. These relations vary very much. Sometimes the organ has an appearance as if it had been compressed from before backwards. It is much less common to find the transverse measurement decreased.

In a series of fifty adult prostates which I dissected and presented to the Medical and Chirurgical Society,[1] thirty-three were healthy. Their measurements and weights are furnished in the following table:—

THIRTY-THREE NORMAL PROSTATES.

No.	Age	Weight	Length	Breadth	Thickness
		drs. grs.	inches	inches	inches
1	79	4 48	1·4	1·45	·85
2	42	3 37	1·3	1·4	·6
3	47	4 57	1·8	1·7	·65
4	85	4 44	1·25	1·55	·95
5	47	5 33	1·4	1·7	·9
6	63	4 35	1·35	1·7	·7
7	50	4 34	1·5	1·7	·65
8	54	4 8	1·25	1·8	·75
9	90	4 58	1·25	1·85	·85
10	52	4 13	1·5	1·75	·6
11	54	4 37	1·5	1·75	·7
12	66	4 27	1·4	1·5	·65
13	63	4 3	1·35	1·5	·65
14	79	4 2	1·4	1·6	·55
15	54	4 50	1·5	1·7	·7
16	70	4 55	1·4	1·8	·7
17	66	4 56	1·4	1·7	·75
18	74	4 4	1·3	1·6	·7
19	61	4 16	1·3	1·6	·8
20	56	3 56	1·25	1·75	·75
21	21	3 34	1·3	1·4	·7
22	40	4 30	1·55	1·6	·75
23	64	5 2	1·4	1·75	·9
24	50	5 20	1·55	1·75	·8
25	73	4 48	1·6	1·8	·6
26	50	4 46	1·4	1·9	·55
27	46	5 4	1·5	2·0	·55
28	66	4 35	1·5	1·75	·6
29	66	4 6	1·5	1·65	·6
30	65	4 24	1·4	2·0	·6
31	55	5 30	1·3	1·8	·85
32	54	4 48	1·4	1·75	·7
33	61	4 54	1·3	1·75	·75

An analysis of the measurements produces the following results:—

	Inch.
From base to apex the measurements ranged between	1·3 and 1·8
But the measurement most commonly met with was	1·4
The greatest transverse, near base, ranged between	1·4 and 2·0
But the measurement most commonly met with was	1·75
The point of extreme thickness when measured ranged between	·55 and ·95
But the measurement most commonly met with was about	·7

---

[1] The various statements regarding conformation, size, &c., of the prostate given in this work are founded on chiefly these dissections, which were exhibited at the Medical and Chirurgical Society, Feb. 10, 1857, in illustration of a paper entitled 'Some Observations on the Anatomy and Pathology of the Adult Prostate,'

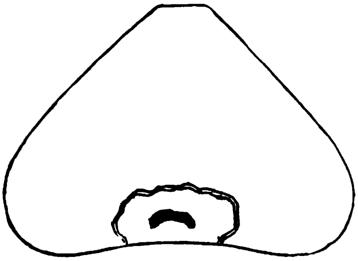
The measurements of twenty healthy specimens which I have since examined and sent to the Royal College of Surgeons, correspond very nearly to the above.

The measurement in inches may then be expressed (in average terms) as follows:—

	Inch.
From base to apex	$1\frac{1}{4}$ to $1\frac{1}{2}$
Greatest transverse diameter, about	$1\frac{3}{4}$
Greatest thickness, about	$\frac{5}{8}$ to $\frac{7}{8}$

(See fig. 2.)

FIG. 2.



These are smaller than those given by Dupuytren, who represented, in connection with the subject of Bilateral Lithotomy, the prostate as measuring twenty to twenty-four lines transversely, and ten to twelve in thickness; and on these estimates his calculations for that operation were based.[1] They correspond, however, very nearly with those by Deschamps,[2] Senn,[3] Dr. Gross,[4] and Dr. Hodgson,[5] all of whom have made practical researches relative to the size of the organ.

The important result of measurements, as regards Lateral Lithotomy, is the length of a line directed downwards and outwards from the centre of the urethra (which may be regarded as corresponding in the operation with the bottom of the groove in the staff) to the outer border of the prostate at its vesical extremity. This line may be considered as falling midway between the horizontal and vertical planes, forming with each, therefore, an angle of 45°, when the patient lies in the position for lithotomy. It may be accurately deduced from the form and measurements given above, and has been verified by numerous actual sections of the organ.

---

and published in the fortieth volume of the *Transactions*. The method of examination in each case was that described at page 4.

[1] *Mémoire sur l'Opération de la Pierre*, p. 21. Paris, 1836.

[2] *Traité Historique et Dogmatique de l'Opération de la Taille*, vol. i. pp. 39, 40. Paris, 1796.

[3] *Traité d'Anatomie Chirurgicale*, vol. ii. pp. 327–330. Par J. F. Malgaigne. Paris, 1838.

[4] *Diseases of the Bladder, &c.* Phil., 1855, 2nd ed. p. 69.

[5] *The Prostate Gland, and its Enlargement in Old Age*, p. 34. London, 1856.

the prostate on its way to the bladder, where it becomes continuous with the fibrous structures which surround the neck of that viscus, and belong to its muscular apparatus. They have acquired also the name of pubo-prostatic ligaments. The ligament of each side corresponds with its fellow, and there is a groove or depression between the two, where the fascia sinks to the apex of the prostate, and becomes continuous with its sheath there.

The muscular attachments of the prostate are the levatores prostatæ. Each muscle of this pair arises from an oblique line on the posterior surface of the pubic bone, its most anterior fibres descending to meet those of its fellow just in front of and below the apex of the prostate, its middle and posterior fibres continuing to be inserted along the lateral borders; in this manner the organ is, in a measure, suspended in its place.

The posterior surface of the prostate is somewhat convex in its character, and is closely attached to the anterior wall of the rectum; only a small quantity of thin fascia, continuous with its sheath from the recto-vesical fascia, existing between the two. It is applied to that portion of the rectum which is known as its middle third, lying in the anterior concavity of the bowel here, but as this turns downwards through its lower third to open at the anus, there is a slight interval between the bowel and the apex; the line of the urethra and the line of the bowel diverging considerably as each pursues its course. The outline and position of the prostate may be readily made out by the finger, which, when carried through the sphincter ani (the hand being in the supine position), feels first immediately above it, supposing the subject examined to lie on his back, the posterior extremity of the bulb and the membranous urethra; then, as the finger proceeds, the apex of the prostate; and lastly its body, composed of two lateral divisions, widening outwards to its base, which is also definable if the bladder is empty, but with less ease when it is distended with fluid.

Vessels and Nerves supplying the Prostate.—The inferior vesical artery furnishes a branch, vesico-prostatic, which passes to the side of the prostate, and is the chief source of supply; this vessel divides into smaller branches in front of the gland which supplies it, and anastomoses with others from the corresponding vessel of the opposite side. A smaller supply is derived also by small and unnamed branches from the internal pudic artery, and from the middle hæmorrhoidal branch of the inferior vesical artery.

Such is the usual mode of vascular supply to the prostate; but there is also an unusual arrangement of the vessels, which, occasionally occurring, it is no less necessary to be acquainted with than with the usual mode of arterial distribution supplied to, or lying in the neighbourhood of, the prostate.

When the pudic artery is small or defective, and fails in one or two, or, it may be, even in three, of its named branches, another vessel supplies its place, and usually derives its origin from the trunk of the pudic, just before it makes its transit through the sacro-sciatic foramen. This vessel is called the 'accessory pudic,' having been thus named by Mr. Quain, who has described the deviation referred to, and has given drawings of it in his work on the Arteries, pointing out, moreover, an important practical fact connected with the anatomy of the prostate which is involved by this deviation.[1]

Mr. Spence, of Edinburgh, describes cases in which the artery ordinarily supplying the prostate has not divided into branches in the usual way, but has pursued its course to the apex of the prostate, and has thus become the source of dangerous hæmorrhage in lateral lithotomy.[2]

Numerous veins pass in front and along the lateral borders of the prostate, into which the smaller vessels of the prostate itself enter; the large veins in question commence in the dorsal vein of the penis, which is a vein of considerable magnitude. The dorsal vein penetrates the deep perineal fascia about half an inch below the arch of the pubes. On arriving at the prostate it divides into two branches, each of which passes by one side of the gland and the neck of the bladder, where it unites and anastomoses with the vesical veins, which are numerous and aggregated about the neck and base of the bladder. The name of prostatic venous plexus has in consequence been given to the veins associated in this situation, and they are prone to be large, and sometimes tortuous or varicose, especially in elderly subjects. From these sources the blood is returned towards the heart through the internal iliac veins.[1]

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[1] Mr. Quain describes this vessel as follows:—'The course (of the Accessory Pudic) within the pelvis towards the prostate gland differs in different cases according to the place of origin. Most frequently the artery proceeds forward near the lower part of the urinary bladder: it lay on the side of that organ in the body from which figure 5 in plate 63 has been drawn; and when placed on the anterior part of the pelvis arising from the obturator or epigastric, it descends immediately behind the body of the pubes.

'In passing by the prostate and urethra—and it is here that the exact situation of this artery is of serious concern to the practical surgeon—the accessory pudic lies on the upper part of the gland, or, it may be, for a short space likewise on the posterior margin; and then proceeding forward above the membranous part of the urethra, it reaches the perineum and divides into the terminal branches.' . . . 'I have not seen the accessory pudic artery approach the side of the prostate in any case but one, and of this a drawing is given in plate 63, fig. 4.'

'BRANCHES.—The accessory pudic has in some bodies the course of the vesico-prostatic, and being substituted for this artery, or more properly, perhaps, an extension of it, furnishes branches to the same organs in the pelvis.'—*The Anatomy of the Arteries of the Human Body.* By Richard Quain, F.R.S. Page 443. See in connection with this subject plates 63, 64, and 65, and the explanatory letter-press.

[2] *Edin. Med. Journal,* vol. i. p. 157, 1841.

Some minute vessels, chiefly venous, may be traced beneath the mucous membrane of the prostatic urethra, for the most part taking parallel lines, on either side of the verumontanum; these, however, are much more obvious in the membranous and bulbous portions of the urethra than in the prostatic.

The lymphatics of the prostate enter lymphatic ducts, accompanying the veins under the fascial sheath. They are distributed on the surface of the proper capsule, and their efferent ducts carry their contents to the lymphatics associated with the iliac vessels. A few lymphatics also are found under the urethral mucous membrane.

The nerves supplying the prostate and adjacent parts are of considerable size, and constitute the prostatic plexus of the sympathetic, which is a prolongation downwards from the inferior hypogastric plexus. As the nerves pass forward to the penis, they may be traced between the levator ani on each side and the gland, to which they supply filaments in their course.

ANATOMICAL CONFORMATION OF THE PROSTATE.—LOBES.

It has been customary to regard the prostate as presenting several divisions, naturally indicated by conformation, but subordinate to a general continuity of structure throughout.

These are as follows:—Two 'lateral lobes,' which are symmetrical; and a 'middle' or 'third lobe' between them behind the urethra. Besides these there are portions of prostatic substance, which unite the lateral lobes before and behind the urethra, to which special names have been applied; for example, *the anterior and posterior isthmus*, to the anterior and posterior uniting portions; or, to the same parts, *the anterior and posterior commissure.*

I. *The Lateral Lobes.*—Not only does the conformation of the prostate at every age, from childhood to adult life, indicate that it is mainly divisible into two lateral portions, but the history of its early development corroborates the same view. Up to about the fourth month of fœtal life, the organ exists as two independent lobes, which become united first posteriorly and then anteriorly during the fifth month, so as to present the complete form soon after the middle of intra-uterine existence; the size, however, is extremely small, and the general contour is less angular than that which it subsequently assumes.

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[1] This condition is well depicted in the work on the Arteries just named. See plate 65, figs. 2 and 3, the latter representing the varicose and tortuous condition alluded to.

The propriety of accepting these two divisions may be hel undoubted. Each lobe may be regarded as nearly ovoid in form. two may be described as lying side by side, as applied or very closely approximating at their apices, as diverging a little at their bases and posterior aspect, and as slightly separated by the canal of the urethra, which covers with mucous membrane and delicate submucous tissues their convex surfaces, which are contiguous to each other in the median line. The anterior borders of the lateral lobes may be regarded either as coalescing or perhaps more correctly as united by a thin intervening portion of muscular and connective tissue (see page 17), but in any case it may be denominated the anterior commissure or isthmus. The posterior borders have a larger interval between them occupied consequently by a larger interposing mass of substance, which has next to be considered. These two lobes have rounded posterior extremities, which, projecting somewhat, present an angular interval or notch between them; and this it is which gives the conventional heart-shape to the entire organ.

II. *The 'Third' or 'Middle' Lobe.*—Lying between the posterior borders of the lateral lobes is a stratum of tissue uniting them throughout their length. As it approaches the base, this stratum becomes thicker and sometimes has a rounded form, as if it were a distinct isolated and independent formation, perforated about the middle by the ejaculatory ducts. It is that moiety of the stratum which lies nearer the apex to which has been applied the term 'isthmus,' or 'posterior commissure,' while the thicker part, situated at the base, has received the appellation of 'third or middle lobe,' and its existence as an independent lobe is regarded by most authorities in this country as a fact in normal anatomy. This, however, I am compelled to call in question, and shall give the reasons for doing so in detail. The idea appears to have originated with Sir Everard Home, who accorded to the part in question the title of 'third' or 'middle lobe,' after five examinations of the organ by dissection, performed by Sir Benjamin —then Mr.—Brodie, and he announced the result as the discovery of 'a middle lobe' to the Royal Society, Feb. 20, 1806; the inquiry having been first instituted, to use the words of his paper, two months before. 'Previous to this investigation,' says Sir E. Home, 'it was not known to me that any distinct portion of the prostate gland was situated between the vasa deferentia and the bladder. These ducts were considered to pass in the sulcus between the two posterior portions, in close contact with the body of the gland.'[1] Notwithstanding this remark, the vasa deferentia had been described as perforating the posterior portion of the prostate by several of the anatomical authorities of the time, as E. Home afterwards learned, and admitted in his first volume on 'Diseases of the Prostate,' published five years subsequently, viz., in 1811. Respecting the five dissections spoken of, the author says, 'the appearance was not exactly the same in any two of them.' The first preparation appears to have been from the person of an elderly patient, 'who had died in consequence of this part *being diseased*; the nipple-like process was very prominent.' In the next, 'there was *no apparent glandular substance*' at all in the spot indicated. All that is said of the third is, that 'there was a lobe blended laterally with the sides of the prostate gland;' but that there was really no distinct portion marked off as a lobe is clear, from the importance attached to such a formation being detected in the two subsequent cases. The most distinct appearance was found in two subjects of twenty-four and twenty-five years of age respectively; and upon the condition of the organs in these (and not in five) his account seems to have been based, and from these two cases the existence of an independent 'lobe' was deduced. Whatever may have been their condition (and of course senile enlargement was not present in either), the existence of a distinctly marked lobe between the ejaculatory ducts and the verumontanum, at the inner meatus of the urethra, is an uncommon and not a usual condition. Any appearance of a lobe in this situation must be regarded as belonging, not to normal, but to morbid anatomy, a slight development being usually attended with some signs of obstruction to the function of micturition. And thus it has been regarded by some of the earliest labourers in Pathological Anatomy, who have left to us the records of their observations. Morgagni, for example, in his work 'De Sedibus et Causis Morborum,' refers to it in several places as to a morbid growth causing retention of urine; in one of which he describes it, from his own dissection, in the following precise terms: 'A roundish protuberance, of the bigness of a small grape, covered over with the internal coat of the bladder. What this protuberance was I readily supposed, and by forcing the knife into it, I cut through this and the contiguous prostate gland at the same time, lengthways, and showed that it was of the same nature with the gland; that it was very evidently continuous from it, and that there was no doubt but, if it had grown out to a greater degree, it must have been a very considerable impediment to the discharge of urine.'[1] In another case he describes the same appearance, pronouncing it 'beyond a doubt an excrescence of the prostate gland.'[2] He quotes several similar cases from Valsalva, Thomas Bartholin of Padua, and Valisneri, who indeed speaks of an enlargement, 'as it were, a kind of lobe, from the glandular substance' (of the prostate) 'which rose up within the bladder, of the shape and size of a walnut, and not on the anterior part, but on that which lies adjacent to the intestinum rectum.' He enumerates other cases, mostly from the 'Sepulchretum' of Bonetus,[1] besides alluding prospectively to one which subsequently appeared in the succeeding letter of his own work;[2] and then makes the following generalisations from the whole:—

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[1] *Philosophical Transactions*, 1806, Paper viii. 'An Account of a Small Lobe of the Human Prostate Gland, which has not before been taken notice of by Anatomists.' By Everard Home, F.R.S.

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[1] *De Sedibus et Causis Morborum per Anatomen indagatis.* By J. B. Morgagni. 2 vols. folio. Venice, 1761. Letter xli. article 18.

[2] *Idem.* Letter xxxvii. article 31.

'If you attentively examine those examples which I have pointed out, . . . you will observe that they were all from old men; and in like manner, if you examine all my observations in which there was the beginning of an excrescence, you will find that this was found to grow out in the very middle of the internal and upper circumference of the gland, posteriorly; but whether all these things happened by chance, or otherwise, future observations will show.'[3]

Some considerable time after this that future was realised; Morgagni returned to the investigation of this subject, and the cause of his doing so is of great interest in relation to the present inquiry. It appears that a 'celebrated anatomist' of the time (Morgagni refers, without doubt, to Lieutaud, although he omits all mention of his name, as he states to be his invariable custom when he proves a contemporary to be in error) declared that an eminence at the neck of the bladder was not a morbid growth, but a small part quite natural, and common to all bodies, calling it the 'uvula vesicæ.' Morgagni therefore devotes great part of the sixty-sixth and the whole of the seventieth letters to the refutation of this view. In the former, stating that, during forty-four years as anatomical professor, he had most carefully dissected at Padua sixty or seventy bodies, and found it only in four; that he had dissected a dog for the express purpose of seeking it, but in vain, and that he had decided that it could be nothing but 'a morbid excrescence of the prostate gland appearing in old men, . . . not rare, but not so frequent.' That Valsalva, Pohlius, and his friend Santorini, regarded it in the same light, the latter presenting it in a drawing as a body 'prominent in diseased bladders,' besides referring to it as 'a circumstance which is diseased and unfrequent, and does not deserve to be exhibited as perpetual and constant, to the great detriment and misleading of young practitioners.'[4] The seventieth letter Morgagni devotes to the purpose of giving the result of his forty-fifth year of teaching anatomy, in relation to this very subject, stating that he had dissected in public five subjects, and in none of them, although he had sought most carefully, was there any trace of this 'roundish protuberance.'

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[1] *The Sepulchretum, sive Anatomia Practica.* By Theophilus Bonetus, M.D. Lyons, 1700. Book iii. sects. 24, 25.

[2] *De Sedibus, &c.* Letter xlii. article 11.

[3] *Idem.* Letter xli. article 19. See the English translation by Dr. B. Alexander. London, 1769.

[4] *Observationes Anatomicæ.* By Jo. Dom. Santorini. Venice, 1724. Chapter x., 'De Virorum Naturalibus,' in explanation of tabula 2, fig. 2, sects. 20 and 22, pp. 201–205.

John Hunter similarly regarded it, after independent examinations of the organ, stating that 'a small portion of it (the prostate) which lies behind the very beginning of the urethra, swells forward like a point, as it were, into the bladder, acting like a valve to the mouth of the urethra.'[1]

It seems remarkable, considering the very slight grounds upon which the existence of a distinct third lobe as a normal and ordinary constituent of the prostate was affirmed by Sir Everard Home, that it should have been so generally received without question by English anatomists to the present day. Its existence is denied by most French observers. Cruveilhier expresses the general opinion when he says that, the ejaculatory ducts being received into a groove or channel in the substance of the prostate, a portion of variable size is indicated by them, but that it has no title to be called a lobe. It is not, he says, an isolated piece, and should be called 'the median portion.'[2]

The following is the result I have obtained after carefully prosecuting numerous dissections of this part:—

Firstly.—I cannot find in healthy bodies, below fifty years of age, any formation in the situation described, capable of being recognised as a distinct 'third' or 'middle' lobe, and am compelled to conclude that any marked prominence there, which appears to possess independent characters (as regards size or form), must be considered abnormal or morbid.

Secondly.—There is unquestionably a thick uniting stratum of tissue between the lateral lobes, which is sometimes slightly thicker in the middle line, at the vesical or basic end, than at its borders, where it becomes blended with those lobes. It is at this thickest part, three or four lines below its urethral aspect, that there exists a perforation for the entry of the ejaculatory ducts. But in many cases this thickening in the median line does not exist; and it is to be remembered that the part in question immediately underlies the uvula, which is not a portion of the prostate, but a prominence caused by crossing interlacement of muscular fibres from the inner coat of the bladder, and sometimes prone to be unduly developed. If this fact is not borne in mind, a confounding of the two structures may arise, and the error of regarding them as one will lead the observer to attribute inaccurately a middle lobe to the prostate; and I think it has not unfrequently happened that the existence of a distinct middle lobe has been affirmed after simple inspection of the interior of the bladder, without further examination, which alone can determine, in all cases, whether a small projection at the neck is due to hypertrophy of the tissues of the uvula, or of the prostate, or to a small tumour embedded in the organ at this point.

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[1] *A Treatise on the Venereal Disease*, p. 170. By John Hunter. 2nd edit. London, 1788.

[2] *Anat. Path. du Corps Humain*, livr. xvii. p. 3. Paris, 1835–42. Par J. Cruveilhier. See also *Traité d'Anat. Path. Générale*, tome 3me, p. 46. Paris, 1856. By the same. Langenbeck also takes the same view. *Neue Bibl.*, b. i. p. 360. Hanover, 1818.

But, thirdly.—The posterior commissural part in question does possess a specific character, which distinguishes it from other parts—a character which appears to have been less prominently regarded, perhaps, than it has deserved to be in the discussion of its title to the name of third lobe, and which appears to entitle it to some distinguishing appellation. Moreover, this character seems to be connected with that tendency to enlarge, which this part of the organ undoubtedly possesses, and which will be fully discussed hereafter. It is this, that the portion in question certainly contains a larger proportion of glandular structure than most parts of the entire organ. Thin slices from this portion placed under the microscope and compared with slices from other parts demonstrate this very clearly.

Considering, then, all the terms which have been proposed to designate the part in question, there does not appear to be sufficient ground for continuing the term 'lobe.' On the contrary, it appears desirable to adopt that which the French anatomists have employed, viz., 'the median portion,' since it is sufficiently accurate, and it is perhaps not wise, without ample justification, to alter a term already used in that modern language, which in scientific literature is perhaps, at the present day, the most widely understood. If, retaining the terms 'lateral lobes' as universally accepted, we apply to the part anterior to the urethra (standing position of the body) the term 'anterior commissure'—a part which is about one inch in length—and the term 'posterior commissure' to that which corresponds to it for the same length behind the urethra, it leaves that thicker portion of the organ which lies behind the verumontanum, which is penetrated by the ejaculatory ducts, which is largely occupied by glandular structures, and which is prone to great increase of size in age, to be designated by the term 'median portion,' conformably to the practice already pointed out.

Course of the Urethra through the Prostate.—Commencing at the neck of the bladder, the urethra continues through the prostate, in the erect position, downwards and slightly forwards. The great masses of the organ lie on either side of the canal; a stratum of prostatic tissue lies in front, and another behind it. It has been a disputed question whether the anterior or posterior stratum be the larger. Most observers state that, in the normal condition, the larger portion is found behind the urethra. Thus, Mr. Adams states that 'two-thirds of the gland are below this canal' (the urethra).[1] On the other hand, Mercier long ago asserted that the anterior stratum is larger and thicker than the posterior, and he states that, after renewed examination, he is assured of the accuracy of his view.[2] Dr. Hodgson, who has carefully studied the anatomy of the prostate, writes as follows:—'It is generally stated that the urethra lies at a distance of two lines from the upper and four lines from the lower surface of the gland. These measurements are by no means constant; according to my observation, they are pretty regular in the prostates of young persons of eighteen to twenty-two years of age, while in older individuals the amount of glandular tissue above the urethra equals, and occasionally rather exceeds, that below the canal.'[3]

In order to examine more completely this question, I removed ten healthy adult prostates, and have made a very careful section from the anterior or pubic aspect to the posterior or rectal one. From these preparations, now in the College of Surgeons, the accuracy of the following report can be tested.

The ages of the ten subjects ranged between thirty-five and fifty-seven years; all may be regarded as non-hypertrophied, by the weight test; the lowest being 4 drachms 10 grains, and the highest 5 drachms 36 grains.

In seven, the area of cut surface displayed by a median section from pubic to rectal aspect, was about equal, above and below the urethra (the organ removed and lying with its pubic surface upwards). In two, the area of cut surface displayed was rather larger below than above; in one the converse condition was found. (See fig. 4).

But it appears to me, judging from the conformation of the specimens, and not from the cut surfaces merely, that there is a rather larger mass of prostatic substance below than above the urethra, in all these specimens except two or three.

The Prostatic Urethra.—Supposing a specimen of the adult bladder and about 3 inches of the adjoining urethra, including the prostate gland and other underlying structures, to have been removed from the body, and to be placed on a table with the pubic aspect uppermost, the urethra is to be exposed by dividing all the tissue lying, in that position, above it, and by opening out the sides of the incision. The following parts are then to be observed in that part of the urethra which lies under consideration.

The vesical boundary of the prostatic urethra is the *uvula vesicæ*, seen as a slightly rounded prominence of the floor of the neck of the bladder. From this point forward the canal gradually expands a little and presents a general indication of hollowing or depression of the floor, varied by a central longitudinal elevation, the verumontanum. This eminence commences in a faint whitish line directly in front of the uvula, and gradually rising for six or eight lines reaches its highest point, about the $\frac{1}{8}$ of an inch, in the central line of the urethra. It widens and becomes rounded at the highest point, and then, somewhat suddenly diminishing in size as it advances forward, exhibits on the anterior slope a small opening, then, gradually lessening, leaves the prostatic and enters the membranous urethra. The depression of the prostatic urethra, *sinus prostaticus*, is thus divided into two lateral furrows, one on each side of the verumontanum; in these may be observed numerous little orifices, mouths of the prostatic ducts, which, when examined with a common magnifying glass of low power, may be counted without difficulty. Not less than twenty or twenty-four, sometimes thirty, may in this manner be distinguished. They are ranged chiefly on each side of the eminence of the verumontanum, but a few may be seen both before and behind it.

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[1] *Cyclop.* vol. iv. p. 146. *Anatomy and Diseases of the Prostate Gland*, 2nd ed., 1853, p. 1.

[2] *Recherches Anatomiques*, p. 30. Paris, 1841. Subsequently, *Gazette Hebdomadaire*, 1860, p. 131.

[3] *The Prostate Gland*, p. 22. London, 1856.

The length of the prostatic urethra varies from an inch and an eighth to an inch and a quarter. Its diameter is usually represented by a fixed measurement; but as the surfaces lie in apposition, except when distended by a functional act, it is difficult to represent accurately the calibre. The walls and surrounding structures are extensible, and the calibre of the canal is consequently variable, corresponding within certain limits to the amount of pressure exerted. Without unduly extending them, the diameter, opposite the crest of the verumontanum, may be regarded as amounting to about $\frac{5}{16}$ to $\frac{6}{16}$ of an inch; but at each extremity of the prostatic limit the diameter is rather less.

The whole of the urethra thus examined presents a surface of mucous membrane, which is covered with cylindrical epithelium, arranged in two layers, a superficial and a deeper layer. The membrane has, when fresh, a pale pinkish-yellow tint, the structures which underlie it being pale, unstriped muscular, connective, and elastic tissues, with fewer minute blood-vessels than are found in the membranous and bulbous portions of the urethra, where a redder tinge consequently exists. These submucous structures are composed chiefly of the pale, unstriped muscular fibres, intermixed with a small proportion only of the white fibrous and elastic tissues. The muscular fibres are arranged in the longitudinal axis of the urethra, and form a thin but somewhat dense and strong layer immediately beneath the mucous membrane throughout the prostate; they continue to have a similar relation throughout the canal, although in smaller quantity than in this situation. Posteriorly they are continuous with the muscular layer immediately underlying the mucous membrane of the bladder. It is by a development of these longitudinal muscular fibres of the urethra that the verumontanum is formed; they divide to define the mouth of the utricle and admit the orifices of the prostatic ducts. These cavities are lined with a delicate membrane and epithelium like that of the prostatic urethra itself.

The precise mode of arrangement of the minute blood-vessels beneath the prostatic mucous membrane is as follows. From the neck of the bladder to the most elevated portion of the verumontanum very few of them are to be seen; and the mucous membrane is of a yellowish tint from their paucity in this situation. In front of it, however, numerous fine vessels course forward, side by side, for the most part in the axis of the urethra, but with a slight oblique divergence outwards, right and left of the pale line of the verumontanum, prolonged into the membranous portion. The mucous membrane is therefore redder in tint anterior to the eminence; and on examining it with a magnifying-glass, it is seen to be due to the minute and longitudinally branching vessels just described.

The utricle, or vesicula prostatica, is a small sac already referred to as opening on the anterior aspect of the verumontanum. It is somewhat oval in form, measuring ordinarily from two and a half to four lines in length, and from two to three lines at its greatest breadth, although occasionally found both larger and smaller. Its posterior extremity is the widest, and the anterior is the narrowest portion. It is obliquely placed, the long diameter being directed towards, or a little below, the median portion, and in the course of the ejaculatory ducts which lie contained in the substance of its lateral walls. The external orifice or mouth of the utricle is sometimes extremely small, and it has been occasionally seen altogether wanting; the orifices of the two ejaculatory ducts were then found opening on the anterior of the verumontanum.

The sac of the utricle is made up of mucous membrane, covered with cylindrical epithelium, and of a submucous tissue attaching it to some bands of white fibrous tissue and pale muscular fibre, by which it insensibly unites with the mass of structures around. It contains mucous follicles which appear sometimes to secrete a dark reddish-brown and jelly-like material; at least, such is found sometimes nearly filling the sac.

When in a quiescent state, the sides of the prostatic urethra are pretty closely applied to each other, and the mucous membrane then lies in very small delicate longitudinal plaits, with a very shallow groove between each. A transverse section shows the canal to have a form generally approximating to triangular, the apex being upwards.

Course of the Common Ejaculatory Ducts through the Prostate Gland.—The common duct, formed by the junction of a vas deferens and of a duct of the vesicula seminalis, enters, in close proximity with its fellow of the opposite side, at the base of the prostate, about three or four lines below the opening which transmits the urethra. There is a well-marked depression, in form pyramidal with the apex directed inwards, in the base of the organ, which indeed corresponds with the apex of the notch separating the two lateral lobes. This depression penetrates the substance of the posterior or 'median' portion, about three-fourths of the mass lying between the ducts and the urethra, the remaining one-fourth forming a thin layer between the ducts and the under surface of the prostate. This proportion varies in different subjects; in all, however, the greater part of the mass lies between the ducts and the urethra. A thin stratum of tissue, $\frac{1}{15}$ to $\frac{1}{20}$ of an inch in thickness, separates the two ducts, as they perforate the organ side by side. They then pass directly to the utricle, and continue their course embedded in the walls of that cavity, one on each side; their little slit-like orifices opening on the anterior part of the verumontanum, at the mouth of the utricle itself. By carefully making a longitudinal section of the utricle, exactly in the median line, the course of the duct may be easily traced.

The ejaculatory duct, from its place of entry at the base of the prostate to the orifice at the utricle, is about six lines in length. It is composed of a mucous lining, or inner coat, some pale muscular fibres surrounding it, with connective tissue intervening; the coats are much thinner and less firm than those of the vas deferens. The muscular fibres are arranged longitudinally in the axis of the duct, and are continued into those which underlie the urethral mucous membrane, close to the mouth of the utricle, and which have been already described.

THE MINUTE ANATOMY OF THE PROSTATE.

Component Tissues and their Arrangements.—It has been already seen that the pale or unstriped muscular fibre enters largely into the composition of the prostate. This has been affirmed by numerous independent observers, among the earliest of whom was Dr. Handfield Jones, whose statement of the fact was first recorded in a paper in the 'Medical Gazette,' August 1847.

In the following year, Kölliker of Würzburg published an account in the 'Zeitschrift für Wissenschaft' (Leipzig) of his examination of the prostate, in which he declared that the larger portion of the organ was constituted by the pale muscular tissue, and that the smaller portion only consisted of glandular tissue. Subsequently, Professor Ellis, of University College, closely investigated the same subject, and came to a similar conclusion.[1]

A description has already been given (p. 19) of the arrangement of the fibres which underlie the mucous membrane of the prostatic urethra, viz., a layer of muscular, connective, and elastic fibres, lying in the direction of the axis of the urethra, surrounded by others circularly disposed, and continuous with the circular fibres of the bladder itself. The other tissues which enter into the construction of the organ will be considered in detail.

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[1] *Trans. Med.-Chir. Soc.*, vol. xxxix. pp. 330–1.

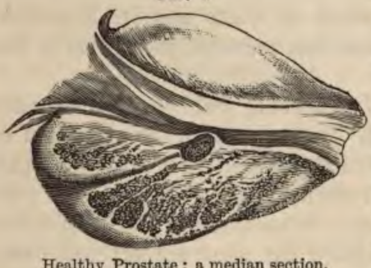
First the two layers of muscular and other fibres just enumerated are perforated by many gland-ducts, from the gland-structures presently to be described. These gland-ducts, passing in a concentric direction, open in the sinus on either side of the verumontanum in the urethra. Besides these, among the outer or circularly disposed layer of fibres, may be found a few small and simple gland-crypts, attached to excretory ducts in their course to the urethra; situated chiefly under the urethra, near the neck of the bladder, behind and not in front of the verumontanum.

The structure of that part of the mass which lies without and beyond these two layers of muscular fibre, constituting the lateral lobes, forms the prostate proper. It is composed of a combination of the mixed pale muscular, connective, and elastic fibres, and of the glandular structure.

The muscular tissue has no very defined form of arrangement; bands of fibres appear to radiate from the urethra outwards in an irregular course, thus leaving numerous interstices. Some of these bands cross and coalesce with the others, at angles more or less acute, and interlace among the elements of gland-tissue, surrounding and packing, so to speak, the lobes of that structure. In the remoter portions of the prostate, the muscular and allied fibres are partially continued into the capsule of the gland itself, and form part of its structure.

The interstices alluded to are occupied by the glandular structures, which, in the lateral portions of the organ, form a large proportion of the prostatic substance, and give it a parti-coloured appearance to the naked eye. When a longitudinal section is made of a lateral lobe, they are easily distinguished by a yellowish tint, and thus their situation, line of direction, and quantitative proportion in relation to the fibrous stroma may be estimated. An antero-posterior section in the median line is represented at fig. 4, from a healthy prostate of natural size, freshly taken from a subject aged fifty-four years; weight of prostate, 4 drachms 48 grains. The utricle is laid open, as well as the ejaculatory duct of the left side, seen to

FIG. 4.



Healthy Prostate; a median section.

traverse the wall of the utricle, slit up to show its situation there. The right duct, previously in contact, is removed with the right half of the organ. The agglomeration of glands which occupies the situation of the 'median portion,' the ejaculatory duct beneath it, and the glands of the lower and posterior parts are easily distinguished, as well as the line of their divergence outwards, backwards, and downwards from the verumontanum.

The glands themselves are, by their structure, in some respects peculiar to the prostate. They are classified with the multilobular or compound racemose glands, of which the salivary and pancreatic are typical examples; but they differ somewhat from these. Regarding them as composed of vesicles or crypts, follicles, ducts, and lobules, they may be described as follows:—

1. The vesicles or crypts are cavities of a partially spheroidal form, varying in size, during the prime of life, from $\frac{1}{300}$ to $\frac{1}{200}$ of an inch. Sometimes only one or two of these exist at the end of a minor duct, but more commonly several are associated, the size and number being very variable, to form a group, having a central cavity common to all or some of them. The vesicles are more or less spheroidal or ovoid in form; sometimes they appear as mere cup-shaped depressions in the surrounding tissue, while others are even flask-shaped or pedunculated. As age advances they become larger, and appear as if dilated.

2. The cavities, more or less composite, and formed by a group of vesicles in the manner just referred to, may be termed follicles, and their size is also variable. Ordinarily, they reach about the $\frac{1}{120}$ or $\frac{1}{100}$ of an inch in diameter. In old men they often reach three or even five times that size. Each follicle has either a duct of its own, as most commonly happens, or it opens at once into a duct common to several others, but leading to the single excretory duct of the lobule to which it belongs. It is peculiar to the prostatic glands that the follicles are of very varying size, and are irregularly placed upon the duct. They are not crowded upon it so as to form a compact mass, as in other racemose glands, but are scattered upon it with considerable and irregular intervals. Hence the tissue is more loosely aggregated, and it is on this account more difficult to trace, and observe with accuracy.

3. The minor ducts are extremely numerous. Each follicle, or small collection of vesicles, has its duct, which is often long, and pursues a straight course to the main trunks, and these, uniting, finally form a single excretory duct from the entire lobule. The smaller ducts lie nearly parallel to each other, and slightly converge as they approach the principal duct.

4. The term *lobule* is held to imply any aggregation of these crypts which, by means of subordinate ducts, is united with the one excretory duct of that series, which then passes on, unjoined by the duct from any other lobule, to the urethra. Each lobule is a complete and

independent glandular structure, like a sweat-gland, and is equally entitled with the latter to the term 'gland.' All these different parts are lined with epithelium of different characters. The walls of the vesicles and crypts are covered with an extremely regular epithelium, the cells of which are ovoid, but become polygonal under the influence of lateral pressure. The epithelial cells are very adherent to each other, and may be removed in masses of convex, or even of tubular form. These cells contain granular matter, and a nucleus a little more elongated, in proportion to its size, than the cell itself. There is no well-marked nucleolus. Viewed in a mass, the cells have a yellow or tawny tint, derived from the granules in their interior, though one cell or a single layer may not exhibit it. Their size is from the $\frac{1}{2500}$ to the $\frac{1}{2000}$ of an inch.

In the minor ducts the lining cells are prismatic; and the same are found also in the largest ducts, and some of the cells are ciliated. The vesicles themselves are sometimes empty, occasionally they are packed with epithelial cells. Sometimes they contain the liquor prostaticus, and not infrequently some may be seen filled with a yellowish, semi-solid, jelly-like, transparent matter, containing epithelial cells, although sometimes without them and homogeneous. Sometimes they contain the concretions which are so familiar to all who have examined the prostate, and which appeared to be always present in the adult organ.

The ultimate gland-vesicles are held in place and united together into follicles and gland-lobules, chiefly by means of connective tissue mingled with a small proportion of pale muscular fibre.

The connecting tissues surrounding the gland-elements support a fine but rich network of capillary blood-vessels, ramifying closely upon the outside of the vesicles. The vascular supply is considerable, judging from the amount and freedom of capillary inter-communication.

The gland-lobules, each made up, as above described, of an assemblage of vesicles and follicles, are about forty or fifty in number. Each sends its excretory duct to open in the urethra near to the verumontanum. Some of the ducts do not open directly into the urethra at the point where they arrive at it, but continue a submucous course until they arrive at the place for opening above named. Occasionally they traverse a considerable distance in this manner, occasionally as much as three-eighths or even half an inch.

The middle-sized and largest ducts have well-marked fibrous walls; they are composed of both longitudinally and circularly disposed fibres of the connective tissue, mingled with a small proportion of the pale muscular fibre. Elastic fibres are not found here.

There is a question which has never been satisfactorily answered, since different observers make very different statements respecting it, viz., Is every part of the prostate pervaded by glandular structures;

and if so, are they distributed in equal proportion throughout? Some years ago I made a careful examination for the purpose, and the following is the result.

In the direct median section of the anterior part of the organ in front of the urethra—in other words, through the anterior isthmus or commissure—I have never found any glandular elements in the median line. Advancing about the eighth of an inch on either side of that line, in some instances, at a smaller distance from it, secreting cells and small crypts make their appearance, and with them often small concretions. In every other part of the prostate the cell-structure is to be found, but it is most abundant in the outer and posterior parts of the lateral lobes, and in the centre of the 'middle lobe' or 'median portion.'

It appears then that the true gland-structure from one lateral lobe does not meet that from the other in the middle line anteriorly, *i.e.*, in the anterior isthmus, and that an interval occupied by simpler structure, and varying in amount in different subjects, exists there; it is worthy of remark also that in that interval I have traced a few voluntary muscular fibres reaching down nearly to the urethra. A section removed from this spot and unravelled will frequently show some striped fibres, although in small proportion. This want of continuity of the gland-structures in front seems to indicate a persistence of the original bi-lobed condition well-marked in fœtal life, and obtaining for the organ the plural name of 'prostates' among the older anatomists. But gland-elements are found in abundance in the middle line behind the urethra.

The proper capsule of the prostate closely covers in the whole organ except at the base and apex, where the urethra enters and issues, and the enveloping structure is there continuous with the adjacent parts respectively, as described at page 8. It is composed of densely applied fibrous tissues, viz., the pale muscular fibre, the connective tissue, and a little elastic tissue, and bands of these enter the substance of the prostate itself in great abundance, being continuous with the stroma of the organ.

The Prostate in Subjects under Adult Age.—In a very early stage of fœtal development, after the rectum has become separated from the bladder, this latter and the genito-urinary organs in front exist in the form of a channel known by the name of the 'sinus uro-genitalis.' Into this, in the male, enter the ureters and vasa deferentia, the latter, at first by one opening, and subsequently the vesiculæ seminales are developed from a portion of the sinus uro-genitalis adjacent to the opening; and each vesicula becoming connected with its neighbouring vas, two independent orifices appear in the place of the single one, and between them the utricle is developed from an original portion of the sinus itself remaining. Around this are aggregated the prostatic glands and fibrous structures, in two distinct masses or lobes, visible as such during the fourth month of intra-uterine life. During the succeeding month an intermediate portion unites them behind (rectal aspect) in the situation of the median portion, and of the commissural part below, to which latter the name of 'isthmus' or 'posterior commissure' has been already applied.

At birth the organ is very small, and it continues comparatively so until the time of puberty. According to the researches of Dr. Gross, of Louisville, it weighs only thirteen grains at the time of birth: his report on the size, form, and weight of the prostate from that period up to adult age is very complete, and may be given here.

'*The prostate at birth.* Width, at base, 4 lines; a little above middle, 5 lines; at apex, 2 lines; length along the middle, 4 lines, and at the edge 4¾; thickness at base, 2 lines; at middle, 3¼; and at apex, 1¼. Weight, 13 grains.

'*The prostate at* 4 *years.* Breadth at base, 6 lines; just above the middle, 7; and at the apex, 2½; length along the middle, 6 lines; and 7 lines at the margin; thickness at base, 2¾ lines; at the middle, 4; and at apex, 2. Weight, 23 grains.

'*The prostate at* 12 *years.* Width, 8½ lines at base; 9½ above the middle, and 3 at apex; length along the middle, 8 lines, and 8½ at the edge; thickness at base, 3 middle, 4½; and at apex, 2¾. Weight, 43 grains.

'*The prostate at* 14 *years.* Width at base, 11 lines; at middle, 9½; at apex, 4; length along the middle, 8 lines, and 10 at margin; thickness, 3½ at base, 5 at middle, and 3 at apex. Weight, 58 grains.

'*The prostate at* 20 *years.* Breadth at base, 14 lines; at middle, 16; at apex 5½; length along middle, 15 lines, and at edge 16; thickness at base, 8 lines middle, 10; and apex, 5¼. Weight, 4 drachms and 1 scruple.'[1]

Mr. H. Bell, in an inaugural thesis, which he published in Paris, made observations, which have been copied by Malgaigne in his 'Traité d'Anatomie Chirurgicale,'[2] resulting from a dissection of upwards of forty subjects ranging between two and fifteen years of age. They are as follows:—

Ages	Diamètre Transverse	Rayon Postérieur Oblique	Rayon Postérieur Direct	Rayon Antérieur Direct
ans	mm.	mm.	mm.	mm.
2 à 4	12·40 à 13·5	4·5 à 5·	2·25	1·
5 à 10	13·5 à 17·	5· à 7·	4·5 à 5·6	1·
10 à 12	16· à 19·	6· à 8·	4·5 à 5·6	2·25 à 3·4
12 à 15	19· à 22·	8·	4·5 à 5·6	3·4

I dissected one specimen at twelve years, which forms a preparation at the College of Surgeons, and the weight coincides very closely with that of one at the same age in Dr. Gross's series.

At twelve years; weighs	40 grains.
Length	an inch.
Breadth	three-quarters.
Thickness	three-eighths.

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[1] Gross *On the Urinary Organs*, 2nd ed. p. 70.

[2] Malgaigne's *Traité d'Anat. Chir.* &c., tome ii. pp. 483–4. Paris, 1859.

We must not overlook the researches of Deschamps made on a great number of bodies. In his 'Traité Historique et Dogmatique de la Taille'[1] he reports as follows:—

1. 'In subjects from three to eight years of age the anterior thickness of the prostate' (anterior to the urethra) 'is a line and three-quarters; its posterior part two lines and a half; and its lateral parts three and a half lines.' . . . 2. 'In subjects from eight to sixteen years the thickness of the anterior part is about two lines; of the posterior part three lines; of the lateral parts four or five lines.'

The following general considerations are those of importance in reference to this subject.

The position of the prostate in children differs from that in the adult subject. It is more vertically placed in the pelvis than in that of the latter. The bladder has a corresponding position, its lower fundus is less depressed, less sessile on the rectum than it becomes later in life. The peritoneum comes very near to its base; but as the fundus is developed in later life, the peritoneum becomes further removed, and a well-marked space, or portion of the bladder (carefully noted both by the anatomist and the surgeon), remains uncovered by it beyond the prostate.

The form of the gland is more rounded in childhood, and has less of the distinctive characters and outline which mark the adult organ and its lobes. Its consistence is soft, the capsule is easily torn, the glandular structures are simple, and slightly developed, being apparently little more than simple follicles, tubular and crypt-like, and ducts.

CHAPTER II.

FACTS RELATIVE TO WEIGHT, SIZE, AND MORBID CONDITION, OBTAINED BY DISSECTING THE PROSTATE.

Dissections by the Author—Dissections subsequently made by Dr. Messer—In all, 194 Examples of Dissected Prostate, presented in the form of a Table.

At the conclusion of the foregoing description of the prostate, and before considering its diseased conditions, appears to be the most appropriate spot for placing the data from which many of the conclusions given respecting both subjects have been drawn. These consist in researches by dissection which are tabulated below. I have made numerous other dissections for the same purpose; but these having necessarily resulted in destruction of the organ are not recorded here; every one of those reported here as my own having been preserved and exhibited as wet preparations.

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[1] Paris, 1796, vol. i. pp. 39-40.

A Tabular View of the Facts observed in 194 *Dissections of the Prostate.*

1st Series.—Thirty prostates removed and carefully dissected by the author, from the bodies of individuals at and above the age of 60 years, as they consecutively appeared in the dead-house of a large metropolitan institution, and exhibited at the Royal Medical and Chirurgical Society in 1856, together with twenty others, showing that hypertrophy was the exceptional and not the prevailing condition of the prostate in advanced age. (Trans. vol. xl.)

2nd Series.—One hundred prostates, subsequently so treated by Dr. Messer, at the Royal Naval Hospital, Greenwich; described at the Royal Medical and Chirurgical Society in 1860. (Trans. vol. xliii.)

3rd Series.—Thirty-four prostates, presented to the Royal College of Surgeons, by the author, in illustration of the Essay on the Healthy and Morbid Anatomy of the Prostate, which obtained the Jacksonian prize for the year 1860.

In treating the above 164 examples of prostates, from subjects at and above the age of 60, no selection whatever has been made; the object having been to obtain them from average lives, occurring in that class of the community which is met with in such institutions.

4th Series.—Twenty prostates, from persons mostly of middle age, all being below 60. These were also dissected and exhibited by the author, at the Medical and Chirurgical Society, in 1856; and they furnish part of the data from which the size and weight of the healthy prostate were deduced.

5th Series.—Ten prostates, removed by the author from healthy subjects in middle age—35 to 57 years inclusive—not furnished consecutively from any one source, and therefore not classed with the foregoing series. They were examined by division in the middle line, to elucidate an anatomical question discussed at page 18.

1st Series.—Nos. 1 to 30.

No.	Age	Weight		Remarks	Length	Breadth	Thickness
		drs.	grs				
1	79	4	48	Healthy	1·4	1·45	·85
2	85	4	44	Ditto	1·25	1·55	·95
3	63	4	35	Ditto	1·35	1·7	·75
4	90	4	58	Ditto	1·25	1·85	·85
5	66	4	27	Ditto	1·4	1·5	·65
6	63	4	83	Ditto	1·35	1·5	·65
7	79	4	2	Ditto	1·4	1·6	·55
8	70	4	55	Ditto	1·4	1·8	·7
9	66	4	56	Ditto	1·4	1·7	·75
10	74	4	4	Ditto	1·3	1·6	·7
11	61	4	16	Ditto	1·3	1·6	·8
12	64	5	2	Ditto	1·4	1·75	·9
13	73	4	48	Ditto	1·6	1·8	·6
14	66	4	35	Ditto	1·5	1·75	·6
15	66	4	6	Ditto	1·5	1·65	·6
16	65	4	24	Ditto	1·4	2·0	·6
17	61	4	54	Ditto	1·3	1·75	·75
18	71	6	40	Hypertrophied; affecting the whole organ pretty equally	1·65	1·9	·9
19	72	5	18	Left lobe larger than right; not hypertrophied	1·3	1·7	·9
20	62	7	15	Hypertrophied, described in Chapter V., showing commencing enlargement of median portion	1·8	1·7	·85

1st Series—*continued.*

No.	Age	Weight		Remarks	Length	Breadth	Thickness
		drs.	grs.				
21	74	12	30	Hypertrophied; full of tumours. Described in Chapter VI.	2·25	2·4	1·75
22	73	7	15	Hypertrophied	1·5	2·0	·8
23	61	7	25	Ditto	1·5	1·9	1·0
24	64	6	20	Ditto, small tumours . .	1·5	1·9	·75
25	75	9	50	Ditto, full of small tumours .	1·7	2·1	1·0
26	79	4	36	No hypertrophy; but full of small tumours	1·3	1·75	·8
27	65	6	18	Small tumour, developing in median portion	1·5	1·7	1·0
28	62	6	5	Ditto, and in lateral lobes .	1·4	1·9	1·0
29	73	2	58	Atrophied	1·1	1·8	·6
30	60	2	57	Ditto	1·2	1·45	·55

2nd Series.—Nos. 31 to 130.

No.	Age	Weight		Remarks	
		drs.	grs.		
31	76	3	35	Tumours present	Dr. Messer has placed these, from 31 to 50 inclusive, as prostates under 4 drachms, and therefore to be regarded as atrophied. I think there is scarcely evidence for so considering them; and can regard only Nos. 35, 36, 38, 39, 46, 49, and 50 as *unquestionably* atrophied, judging from the single fact of weight. See Chap. XV., on 'Atrophy of the Prostate.'
32	76	3	20	Ditto	
33	71	3	50	Ditto	
34	87	3	30	Ditto	
35	79	2	30	Abscess	
36	80	3	5	Median portion enlarged	
37	67	3	20		
38	69	2	40		
39	85	2	40		
40	77	3	40		
41	78	3	20		
42	82	3	20		
43	71	3	40		
44	75	3	50		
45	76	3	40		
46	67	2	20		
47	70	3	20		
48	75	3	20		
49	83	2	5		
50	74	3	0		
51	81	5	0	Tumours present	
52	82	5	5	Ditto	
53	68	5	50	Ditto	
54	78	5	30	Ditto	
55	82	5	0	Ditto	
56	71	5	30	Ditto	
57	69	5	0	Ditto	
58	87	5	10	Ditto	
59	85	4	30	Ditto	
60	81	6	0	Ditto	
61	71	4	30	Ditto	
62	76	5	30	Ditto	
63	82	5	50	Little enlargement of median portion	
64	85	5	30	Ditto	
65	72	4	30	Abscess	

2ND SERIES—*continued.*

No.	Age	Weight		Remarks		
		drs.	grs.			
66	80	4	20	Abscess		
67	67	5	40	Healthy		
68	78	5	0	Ditto		
69	76	4	0	Ditto		
70	76	4	40	Ditto		
71	66	5	20	Ditto		
72	84	5	0	Ditto		
73	85	4	30	Ditto		
74	74	4	40	Ditto		
75	94	5	0	Ditto		
76	75	4	30	Ditto		
77	61	4	20	Ditto		
78	81	5	20	Ditto		
79	76	5	30	Ditto		
80	84	5	20	Ditto		
81	81	4	20	Ditto		
82	76	4	10	Ditto		
83	64	4	0	Ditto		
84	81	5	0	Ditto		
85	84	4	40	Ditto		
86	82	4	50	Ditto		
87	75	5	15	Ditto		
88	60	5	0	Ditto		
89	73	4	30	Ditto		
90	71	5	30	Ditto		
91	73	5	0	Ditto		
92	68	4	0	Ditto		
93	70	4	0	Ditto		
94	68	5	0	Ditto		
95	77	6	0	Ditto		
96	72	28	0	Hypertrophied.	All lobes enlarged.	Tumours present.
97	77	9	20	Ditto	ditto	ditto
98	77	6	20	Ditto	ditto	ditto
99	63	14	0	Ditto	ditto	ditto
100	80	19	30	Ditto	ditto	ditto
101	86	7	20	Ditto	ditto	ditto
102	87	7	30	Ditto	ditto	ditto
103	75	16	0	Ditto	ditto	ditto
104	78	33	0	Ditto	ditto	ditto
105	71	10	0	Ditto	ditto	ditto
106	70	10	0	Ditto	ditto	ditto
107	76	10	0	Ditto	ditto	ditto
108	72	17	0	Ditto	ditto	But no tumours.
109	79	12	0	Ditto	ditto	abscess
110	81	6	35	Ditto	ditto	tubercle
111	79	30	0	Ditto	ditto	Tumours present.
112	76	24	0	Ditto	ditto	ditto
113	78	30	0	Ditto	Lateral lobes chiefly enlarged.	ditto
114	76	48	0	Ditto	ditto	ditto
115	74	25	0	Ditto	ditto	ditto
116	62	6	15	Ditto	ditto	ditto
117	74	7	10	Ditto	ditto	ditto
118	78	7	5	Ditto	ditto	ditto
119	77	6	15	Ditto	ditto	ditto
120	64	14	0	Ditto	ditto	ditto

2ND SERIES—*continued.*

No.	Age	Weight		Remarks
		drs.	grs.	
121	84	26	30	Hypertrophied. Lateral lobes chiefly enlarged. Tumours present.
122	75	7	0	Ditto ditto ditto
123	71	9	30	Ditto ditto ditto
124	77	9	30	Ditto ditto ditto
125	60	14	0	Ditto ditto Tumours and abscess.
126	81	12	0	Ditto ditto No tumours.
127	67	17	0	Ditto—left lateral and middle lobes only enlarged. ditto.
128	74	9	10	Ditto—right lateral lobe chiefly do.—tumours and abscess.
129	81	8	30	Ditto—left lateral lobe only do.—generally hypertrophy—abscess.
130	80	8	30	Ditto—middle lobe chiefly do.—tumours present.

3RD SERIES.—NOS. 131 TO 164.

No.	Age	Weight		Remarks
		drs.	grs.	
131	85	5	40	Healthy
132	76	6	0	Ditto
133	83	5	25	Ditto
134	79	4	45	Ditto
135	80	6	0	Ditto
136	75	6	0	Ditto
137	82	6	10	Ditto
138	84	6	40	Ditto
139	61	6	20	Ditto
140	64	5	0	Ditto
141	68	6	10	Ditto
142	65	5	30	Ditto
143	62	5	10	Ditto
144	80	6	15	Ditto
145	87	3	50	Ditto
146	93	4	7	Ditto
147	80	3	18	Ditto
148	75	5	25	Ditto
149	74	4	46	Ditto
150	90	2	50	Atrophied—died of carbuncle.
151	78	2	45	Atrophied—died of phthisis.
152	80	10	0	Hypertrophied Of these thirteen specimens :— In three, hypertrophy affected the whole organ pretty equally. In three, it affected the lateral lobes, mainly and equally. In four it affected both lobes; but the right more than the left. In two it affected both lobes; but the left more than the right. In one it affected all parts; but the median portion chiefly. Five were the subjects of tumour.
153	81	8	10	Ditto
154	83	9	15	Ditto
155	80	8	30	Ditto
156	79	9	6	Ditto
157	84	18	0	Ditto
158	73	10	18	Ditto
159	80	7	6	Ditto
160	77	8	50	Ditto
161	75	7	30	Ditto
162	76	7	50	Ditto
163	78	11	17	Ditto
164	72	12	45	Ditto

4TH SERIES.—NOS. 165 TO 184.

No.	Age	Weight		Remarks	Length	Breadth	Thickness
		drs.	grs.		inch	inch	inch
165	42	3	37	Healthy	1·3	1·4	·6
166	47	4	57	Ditto	1·8	1·7	·65
167	47	5	33	Ditto	1·4	1·7	·9
168	50	4	34	Ditto	1·5	1·7	·65
169	54	4	8	Ditto	1·25	1·8	·75
170	52	4	13	Ditto	1·5	1·75	·6
171	54	4	37	Ditto	1·5	1·75	·7
172	54	4	50	Ditto	1·5	1·7	·7
173	56	3	56	Ditto	1·25	1·75	·75
174	21	3	34	Ditto	1·3	1·4	·7
175	40	4	30	Ditto	1·55	1·6	·75
176	50	5	20	Ditto	1·55	1·75	·8
177	50	4	46	Ditto	1·4	1·9	·55
178	46	5	4	Ditto	1·5	2·0	·55
179	55	5	30	Ditto	1·3	1·8	·85
180	54	4	48	Ditto	1·4	1·75	·7
181	56	5	22	Small tumours, not hypertrophied	1·55	1·75	·75
182	56	6	0	Slight general enlargement .	1·3	1·8	1·0
183	50	5	50	Small tumour developed in median portion . . .	1·3	1·8	1·0
184	21	2	46	Atrophy — emaciation from phthisis	1·25	1·3	·55

5TH SERIES.—NOS. 185 TO 194.

No.	Age	Weight		Remarks	
		drs.	grs.		
185	35	4	30	Healthy	See page 18.
186	39	4	36	Ditto	
187	41	4	50	Ditto	
188	44	4	10	Ditto	
189	45	5	6	Ditto	
190	45	4	40	Ditto	
191	51	4	56	Ditto	
192	52	4	50	Ditto	
193	53	5	36	Ditto	
194	57	5	0	Ditto	

PART II.

THE DISEASES OF THE PROSTATE.

The diseased conditions to which the prostate is liable will be considered in the order presented below. All the deviations from health are enumerated which the study of morbid anatomy, as well as that of the signs and symptoms manifested during life, indicate as liable to affect the organ.

Inflammation of the Prostate: Prostatitis.
,, ,, Acute.
,, ,, Chronic.

Secondary Results of the Inflammatory Process:—
Suppuration.
Diffuse.
Abscess.
Ulceration.

Senile Enlargement of the Prostate; different forms of Hypertrophy and Hyperplasia.
Simple Tumours and Outgrowths.
Atrophy.
Cancer of the Prostate.
Tubercle of the Prostate.
Cystic Disease (?).
Calculi of the Prostate.

CHAPTER III.

INFLAMMATION OF THE PROSTATE: ACUTE AND CHRONIC.

Acute Prostatitis—Causes—Morbid Anatomy— Symptoms — Treatment — Chronic Prostatitis—Causes—Morbid Anatomy—Symptoms—Treatment in its various Forms and Stages.

ACUTE inflammation of the prostate rarely occurs, except as the result of inflammation of the urethra or bladder. When the latter organ is inflamed, the prostate sometimes suffers in a secondary manner and degree. But acute prostatitis more commonly arises from the extension of inflammation which commences as gonorrhœa. Sometimes, perhaps, it may occur primarily in the organ itself, apart from the effect of local violence, as by instruments, &c.; but the evidence respecting such occurrence is imperfect.

Causes.—Systematic writers enumerate many circumstances as giving rise to acute inflammation of the prostate; but relative to many of these, the claim to be regarded as causes is without support.

The alleged causes may be arranged for consideration in three classes, as follows:—

(*a*) Undoubted causes of acute prostatitis.

The pre-existence of acute inflammation of the urethra of any kind, but especially the gonorrhœal, by continuity, as already alluded to. Urethral stricture, in an aggravated form, tending as it does to the production of inflammation and disorganisation of the parts posterior to it, especially those adjacent, the prostate and bladder. The direct application of irritating agents in the shape of strong injections, cauterisation, and mechanical violence of various kinds. Inflammation of the bladder sometimes. Calculi of the bladder and of the prostate itself. The application of cold and damp to the perineum, as by sitting for a long period on moist ground. Urethritis has been referred to as a proximate cause, but it may also be the remote cause, in the circumstances last enumerated, as well as in some of those which come under the next head.

(*b*) Circumstances which cannot be stated with absolute certainty to be causes, but which may, with some amount of probability, be so regarded.

Horse-exercise is affirmed to be a cause of acute inflammation in the organ, by means of the concussion occasioned. That it may aid in producing it when inflammation of the urethra already exists is not improbable. But it cannot be said that hard riders, such as huntsmen, jockeys, or cavalry soldiers, are in any notable degree more subject to it than are other men. Cantharides affects the bladder and not the prostate particularly. Alcoholic drinks, especially when mixed with acids, as punch, may induce prostatic inflammation, gonorrhœa already existing, not otherwise. Inordinate sexual intercourse, under the last-named circumstances, may probably be included in the same category.

(*c*) Circumstances commonly stated to be causes, but respecting which there is little or no evidence to render it probable that they are so.

Diuretic medicines, copaiba, cubebs, and turpentine, even coffee and highly seasoned dishes, are said to cause inflammation of the prostate. Drastic purgatives are similarly regarded by some; also irritations in the rectum, by ascarides, hæmorrhoids, &c. Some of these agents are liable to induce an irritable condition of the bladder, and some of them, perhaps, even some degree of inflammation of the viscus; but I am not aware of any case of acute prostatitis directly or indirectly occasioned by any of these agents. The morbid condition of the organ resulting from the presence of carcinomatous infiltration, or of tuberculous deposit, cannot be regarded as acute prostatitis, although they are often enumerated as causes: a practice which is erroneous and misleading.

Sedentary habits are spoken of as a cause of the affection, but without the slightest shadow of evidence to support the assertion. The same may be said of the alleged influence of constipation. It is probable that want of exercise and a torpid state of the bowels tend to produce an obstructed circulation in the veins of the pelvic organs, as seen in piles; but that this condition can occasion prostatitis it is not easy to believe.

Morbid Anatomy.—An opportunity of studying the morbid anatomy of acute prostatitis, when it forms the primary or the chief affection, is very rare, especially during or immediately after the acute stage. It is much more common to meet with the organ when chronic inflammation or suppuration is present, and when it is no longer presenting the phenomena of acute inflammation.

Nevertheless a few cases have been examined and reported: in one instance I had the opportunity of observing the appearances, and recorded them at the time.

Morbid changes occurring in acute prostatitis:—

A. In the early and middle stages, before extensive suppuration occurs.

The organ is swollen to double or even quadruple its natural size, and feels tense and firm to the hand. The external blood-vessels are loaded with dark blood. On making an incision from the front aspect into the urethra, the mucous membrane is seen to have a deeper tint than natural, although the change is not considerable; the cut surface is redder also than in health. Pressure causes to exude a reddish, turbid fluid, a mixture of effused lymph and serum, of blood from loaded capillaries, and of prostatic secretions. Making an incision through the lateral lobes, the same fluids freely exude. As the inflammation advances, the fluid contains also pus, and a section of the lateral lobes may show several minute spots of thickish pus, not abscesses apparently, strictly speaking, but the gland-crypts, whose cavities are distended with it.

B. Changes which occur in later stages of acute prostatitis.

Numerous deposits of pus appear in the substance of the prostate, from the size of a grain of pearl barley to that of a pea, and even larger; coalescing as the action continues to form an abscess. It has been observed that the pus of a prostatic abscess has a peculiar glutinous or adhesive quality, differing from the creamy character of ordinary healthy pus. Sometimes clots of blood are found, the result of small hæmorrhages into the diseased gland-crypts or other cavities. Portions of the organ may become softened and even gangrenous. The mucous membrane of the prostatic urethra is reddened, or has patches of organised lymph on its surface, the product of inflammatory action; or portions of the membrane may be destroyed, and form the orifice of a cavity or cavities occupying the substance of the prostate itself.

Symptoms.—At the outset, a sensation of weight and fulness about the rectum and perineum is experienced, with pain or uneasiness referred to the neck of the bladder. The patient passes water more frequently than natural, and the act is painful, especially at its close. These symptoms increase; the pain becomes severe, then lancinating, throbbing, and almost continuous; a sense of tension and swelling is experienced, and the anus and perineum are tender when pressed upon. Movements of the body become difficult on this account, as does also the sitting position. The act of relieving the bowels at stool produces considerable distress; still more so does the act of micturition; the stream of urine being generally small, and its passage necessarily prolonged, much straining accompanies it, and the pain is sometimes exquisitely acute. As the organ increases in size and tension, complete retention of urine may occur, and may continue for some days. In these circumstances a finger introduced into the rectum encounters opposition and causes pain, however quietly it is carried through the sphincter: the anterior wall of the bowel is prominent, hard, and hot, and the outline of the prostate may be traced, not, however, without causing severe suffering to the patient. An attack of piles may be induced, the close contiguity of the hæmorrhoidal and prostatic veins appearing to favour this result. At a later stage, if suppuration has taken place, the rectal swelling is softer, local throbbing is experienced, and should a catheter be passed, the patient will complain of excessive pain when the instrument reaches the prostatic part of the urethra.

More or less fever appears after the accession of the earlier local symptoms, rigors often accompanying the onset. Pains in the loins and sacrum, as well as in the glans penis, and running down the thighs, are experienced, and not unfrequently a sensation of constant desire to go to stool. The mucous membrane of the bladder is sometimes involved in the inflammation; the urine is febrile in character, and contains mucus to some amount, occasionally in considerable quantity, if the last-named structure is implicated. Besides this, there may be pus in the urine, from which it is deposited as a sediment on standing.

The chief signs upon which a diagnosis depends may be noted as follows: enlargement of the prostate, ascertained by rectal examination, with acute pain complained of when pressure of the finger is made upon any part of the swelling there; the act of defæcation painful, micturition still more so, complete retention often supervening. If a catheter is introduced, exquisite suffering is caused when it arrives at the prostatic part of the urethra. Added to these, there is constant and deep-seated, often throbbing, pain felt about the fundament. These symptoms alone, but especially when associated with a history of recent urethral discharge, which may have previously ceased or not, will suffice to determine the nature of the case.[1]

Treatment.—In the presence of fever an appropriate mild diet should be enjoined. Small doses of antimony combined with potash may be given frequently; while the bowels should be freely opened at the outset, and a gentle action maintained afterwards.

Local treatment in a young subject may sometimes advantageously consist of a free bleeding from the perineum, and in most cases the application of leeches is the most available means. They should be employed freely, say ten or twelve, on the perineum and around the anus. An expert cupper may obtain eight ounces of blood from the perineum; but in the absence of such an one the leeches are preferable. Leeches to the rectal surface of the organ, introduced by means of tubes devised for the purpose, have been recommended by some; but the effect to be produced in this way must be small, as only one, or, at most, two leeches can be applied at a time.[2] The bleeding over, a hot hip-bath should be taken, then a large poultice or hot flannel placed on the perineum, and the patient be wrapped up warmly in bed. The hip-bath may be frequently repeated with advantage in the course of the treatment, but should not be applied at any one time for a lengthened period. About ten minutes suffices for the bath, which should commence at 100°, and be raised to 105° or even up to 110° during the period named: this is better as a rule than prolonging the sitting to fifteen or twenty minutes. The object of the bath is not to induce a flow of blood to the pelvic viscera, but, on the contrary, to expand and fill the vessels of the skin by a smart impression quickly made, and which is also participated in to a certain extent by every part of the cutaneous surface.

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[1] Some exceedingly well detailed cases of acute prostatitis are given by Vidal de Cassis, who paid special attention to this affection, in the *Annales de Chirurgie*. Paris, 1844.

[2] The instruments which have been employed for this purpose are described and figured in the *Lancet*, vol. xxxix. p. 645, and vol. xl. p. 299.

One of the most troublesome conditions met with is retention of urine caused by the barrier which the swollen prostate offers to micturition. The stream diminishes, at last ceases, and it is then absolutely necessary to pass a catheter as many times in the day as the comfort of the patient requires, probably four times at least in the twenty-four hours. The best instrument, as a rule, is a soft coudée catheter of rather small size, say No. 5 or 6. It is to be removed as soon as the bladder has been emptied; and its employment must be continued, more or less, after the function of micturition begins to re-establish itself, if the bladder is not emptied by the natural efforts.

It is not uncommon that instant relief is afforded by a sudden escape of pus, and this may happen during the employment of the catheter; an abscess in the gland giving way, and the symptoms, both general and local, rapidly diminishing in intensity. In a very few instances it is necessary to make an incision for the exit of pent-up matter, and this may be done by rectum if fluctuation is felt there very distinctly; it is less commonly necessary to incise by the perineum, true abscess of the prostate rarely producing in that direction sufficient signs of its progress to warrant the introduction of the long bistoury. Still it may be occasionally necessary, although abscesses opened in that situation are rather deep perineal or periprostatic than collections of matter in the prostate itself.

The extreme pain and the difficulty in passing water may be, throughout the case, considerably alleviated by the free administration of opium or morphia, by mouth, by suppository, or subcutaneously.

In the course of a few days, the severe pain and the frequent micturition gradually subside, as a rule, sometimes, however, not without the occurrence of an occasional relapse for a day or two, as after some indulgence on the part of the patient, especially after exercise too freely taken or at a too early period. Hence it is necessary to restrain the activity which a young patient is ready to manifest when his complaint begins to recede. Moderation in diet, with total abstinence from alcoholic stimulants, must be enjoined for a time; and perhaps it may be desirable to adopt some treatment to reduce the bulk of the organ, enlarged as it may be from the effect of inflammation. Speaking in general terms, the prostate will be found, on examination after the lapse of about a month from the subsidence of the acute symptoms, still swollen and tender. More than the natural amount of exertion is required in order to empty the bladder, and the stream is propelled with less than the usual degree of force. Such are the only effects remaining when the acute affection terminates in a healthy resolution; and probably in healthy subjects they disappear in the natural order of things by absorption.

Chronic Inflammation of the Prostate.—The affection here described under this title is not very uncommon as an extension from cystitis, and as a result of gonorrhœa it is of frequent occurrence. Nevertheless, its existence is barely recognised by some of the best known writers on prostatic disease, and by some it is not even named.

Chronic prostatitis is met with in three different phases; but the symptoms and pathological characters are much the same in each, and differ in degree rather than in kind. It may solely originate in an attack of acute prostatitis, and show little disposition to diminish after the acute symptoms have subsided; or, secondly, there may be a tedious resolution, leading, by slow steps, to the re-establishment of healthy action; and, finally, the condition may commence in the chronic form, independently of any acute attack, in which case it may affect chiefly the mucous membrane, no glandular enlargement existing; and it may be the primary or sole existing complaint, or it may be dependent on disease of adjacent organs.

It is common to meet with instances in which simple chronic inflammation of the prostate, producing enlargement, is regarded as an example of hypertrophy. Yet nothing can be more distinct than the two affections, if we compare their pathological history and characters. Chronic inflammation, however, does not necessarily cause enlargement of the organ; indeed, this is an exceptional condition, all varieties considered. But when inflammatory enlargement does exist, it is almost invariably in the early or middle periods of life; while hypertrophy never occurs before the fifty-third or fourth year, and is not commonly manifested by painful symptoms before the fifty-sixth or fifty-seventh year. Inflammatory enlargement is almost invariably preceded by some urethral inflammation. Urethral discharge of a purulent nature, numerous flocculent shreds in the first urine passed, and pain during and after micturition, have been or still continue present. Associated with these, there is often an impaired condition of the general health. All these signs may be, and usually are, absent in hypertrophy during its earlier stages. Finally, inflammatory enlargement is due to the effusion of morbid products, lymph, pus, &c., into the substance of the organ; while a hypertrophic enlargement is due, as the term implies, to simple over-production of the normal elements of the prostate gland itself.

Causes.—The most fertile cause of chronic prostatitis is gonorrhœal inflammation, which has extended backwards and affected, more or less acutely, the prostate. Local cold and damp must be recognised as occasionally producing it; more rarely still it is due to mechanical injury inflicted on the urethra or on the perineum. Long-continued indulgence in venereal excesses of any kind is undoubtedly a cause. That form which results from long-standing and severe stricture of the urethra, of chronic cystitis, of calculus, either vesical or prostatic, is common enough and needs no separate consideration; it is the mere result of existing adjacent disease, upon which it altogether depends.

Morbid Anatomy.—I have examined several examples of the prostate gland when in a state of chronic inflammation. The prostate so affected may be found larger, or even smaller, than the natural size; for there is no necessarily constant deviation in this respect; the consistence, if any difference exists, is less firm, the texture is more open and spongy. The colour of the cut surfaces has a more dusky hue, sometimes with a redder tint. More fluid than natural is found in the gland-tissue, and freely issues on being pressed. This fluid is of a dirty hue, and, if firm pressure is made, is stained slightly red. In advanced cases, deposits of pus are found, varying from the size of a grain of pearl sago to that of a pea, but they are few in number, perhaps only one or two are seen, thus contrasting with the numerous disseminated small abscesses met with in the later stages of acute inflammation. The mucous membrane may be thinned and more vascular than natural, with the duct-orifices large; this being the case if there has been dilatation of the prostatic urethra, as sometimes happens behind a stricture: on the other hand, it may be, though rarely, coated in places with organised lymph, giving it a roughened and opaque appearance. Or its own structures may be thickened, not reddened as in acute inflammation, but presenting after death a dull ashy grey, or even slaty hue, the last-named marking long persistence of the unhealthy action. Pus is, in such cases, often found filling the sinus pocularis and the gland-ducts around; and sometimes a cavity filled with pus communicates with the urethra, forming a chronic abscess in the prostate; while it is not very uncommon to find an abscess or abscesses surrounding it, in other words, periprostatic abscesses depending on foregone disease of the prostate itself.

Symptoms.—A patient who suffers from simple uncomplicated chronic inflammation of the prostate complains of a little undue frequency in making water, sometimes of muco-purulent discharge from the urethra, of a sensation of weight and fulness, sometimes of dull pain, in the perineum and about the anus, occasional or persistent, almost always increased by exercise; perhaps of pains in the thighs and legs, or in the sacral region: sometimes increased, but not invariably, by sexual intercourse. There is usually no pain in micturition until the end of the act, when it is occasionally, but by no means always felt, and then it is not acute like that of calculus. There may be tenderness in the perineum, sometimes felt in the sitting posture; tenderness in the prostate itself to rectal examination: an irregularity in form is sometimes detected by the finger, but this is exceptional. The passing of a catheter gives more than usual pain when it traverses the prostatic urethra and neck of the bladder. The urine is a little cloudy, but on examination this condition is found to be mainly due to shreds of tenacious muco-purulent matter, and masses of epithelium, which have their origin in the prostatic urethra, and not in the bladder, as may be ascertained by desiring the patient to pass water into two glass vessels, the first ounce or so into one, the remainder into the other, when the purulent matter will be found in the former portion, while the latter is clear, or almost so. This mode of examining the urine should always be adopted. It separates purely urethral products from the deposits which come from the bladder or from the kidneys, a distinction of considerable importance in all forms of urine examination. In well-marked cases, there appears at the end of the micturition a drop of blood, sometimes more than that, tingeing the last portion of urine passed: an occurrence often exciting a suspicion that calculus exists. This sign, as well as the simultaneous pain experienced, and the fact that the symptoms are increased by much exercise, may render sounding necessary in order to determine the question. Indeed I know no other complaint in which the symptoms so strongly resemble those of stone in the bladder in a mild form.

Further inquiry will frequently discover that the patient has little or no sexual desire, and he may or may not be the subject of frequent involuntary seminal emissions during sleep. The health is mostly somewhat impaired, and general debility is complained of.

Treatment of Simple Chronic Prostatitis.—When the weight and dull pains about the perineum are pretty constant, and there is obvious tenderness of the prostate, both of these conditions being increased by exercise, nothing is so serviceable as counter-irritation at the surface of the perineum, continued for a period of four, six, or eight weeks, and if thus persevered in, benefit is almost certain to follow. It may be accomplished by applying to the part strong 'acetum cantharidis' or 'liquor epispasticus;' the soreness to be kept up by occasional repetitions of the process. It may occasion slight trouble to the patient at first, but by applying daily simple ointment, the inconvenience is lessened. In using the blistering-fluid, care must be taken not to allow it to run downwards to the margin of the anus, nor should it come into contact with the scrotum. The most efficient mode is to paint a surface of the skin of the perineum about half an inch wide and one and a quarter inch long, say, on the right side of the raphé, and in three or four days a similar portion on the left side; so alternating the application every three or four days, which permits to each spot about a week to heal before a renewal of the painting is made. A very small quantity of the blistering-fluid suffices; it is not necessary to produce a very sore surface, or any degree of irritation sufficient to interfere with the freedom of movement on the part of the patient. The common error is to apply it too freely.

If the oozing of blood at the end of micturition persists, the most efficient treatment is to apply a solution of nitrate of silver, about three, four, or five grains to the ounce, to the neck of the bladder. Perhaps the best way of accomplishing this object for these cases is by means of the flexible tube and 'instillation' syringe, as it produces less mechanical disturbance than the metallic injecting instrument recommended in the following page for the cases there referred to in which no bleeding is present. For a description of the syringe and mode of using it, see Chapter XII. on Treatment of Enlarged Prostate and its Complications, in the section treating of Hæmorrhage.

While thus treating the local condition, the digestion also must be attended to, the diet directed, and a daily easy action of the bowels ensured. Exercise can only be taken very gently at first, and may be increased by degrees as soon as the power of taking it without inducing pain or bleeding is acquired.

The digestive organs being in tolerable condition, the use of iron is mostly attended with benefit. The sulphate, combined with sulphate of quinine, and made into pills, with some extract of rhubarb and aloes and a little extract of nux vomica, is an advantageous form of tonic in order to maintain regular action of the bowels, impaired as it usually is by inability to take exercise. The tincture of the sesquichloride of iron is also a good remedy, provided the bowels are not permitted to become constipated.

A common source of complaint among young men is the occurrence of unduly frequent nocturnal emissions. These may be associated with chronic prostatitis, but far more commonly they have no such cause, are the natural and necessary consequence of continence, and are not the result of any morbid condition of the prostate at all; so far only as they are thus related do they come under our consideration here. When, however, with the group of symptoms already described, the patient complains of involuntary nocturnal emissions, occurring irregularly but with great frequency, an instrument may be passed through the urethra. Ordinarily, however, in chronic prostatitis, the contact of a foreign body only increases the existing irritation. The symptoms referred to being predominant, and much pain being felt when an instrument reaches the prostatic urethra, nothing acts more beneficially, in many cases, than the application of a solution of nitrate of silver, commencing with about five grains to the ounce, and increasing it to twenty grains if necessary, by means of a perforated catheter containing a piston, by which the fluid can be set free at the proper spot, and its action mainly limited to it; a matter which it is important to accomplish pretty accurately. In performing this little operation the following course should be pursued. The bladder should first be emptied, by means of a graduated catheter; and the opportunity of doing so should be employed to determine the exact length of the urethra, in the usual manner, while the urine is flowing. The instrument containing the caustic solution should then be passed immediately, the solution being discharged as soon as the perforated extremity has arrived within the prostatic urethra, the situation of which may be correctly inferred, as it coincides with the last inch and a half of the measured canal. The immediate results usually are, frequent calls to pass water, which are painful, and may be attended with slight bleeding; these subside in a few hours, and possibly are succeeded by a little purulent discharge for a day or two. During the first few days the symptoms originally complained of may increase, but afterwards they gradually diminish. Should this, however, not be the case, no fresh application of the caustic should be made until ten or fourteen days have elapsed, as it is impossible to ascertain the effect in a shorter period of time. If necessary, it may then be again applied as before, or with a stronger solution. A third or fourth application may be necessary; but it is rarely desirable to repeat it if not successful on the fourth occasion. Success mainly depends on applying the solution freely and accurately to the prostatic urethra, and when this is ensured, it generally proves a valuable remedy.

When there appears to be little active disease of the prostate, and we have only to deal with the sequel of a severe acute attack, in which convalescence is progressing but very slowly, there is less indication for counter-irritation, and probably none for the employment of caustic in the urethra. One of the most prominent conditions in such a case is the persistence of enlargement and induration of the organ, due to inflammatory deposit which took place during the acute stage. This is the enlargement which belongs to the period of youth, and differs, as before observed, from that which occurs in advancing years, and is known as senile hypertrophy.

The general health being vigorous, those internal remedies which appear to possess a specific power to promote absorption of the effused matters may be employed. Such are the iodide and bromide of potassium. They may be administered conjointly or separately, the latter agreeing with the stomach sometimes when the former will not. Either agent may be combined with fifteen or twenty grains of the acetate or bicarbonate of potash twice a day, or with two or three scruples of the tartrate of potash, if there is a constipated habit of body. These are the more indicated if the urine presents an unduly acid character. If the enlargement is considerable, it may be wise to employ also local blistering as above described.

Respecting chronic inflammation of the prostate, resulting from prior disease in associated organs, as stricture of the urethra, calculus, organic disease of the bladder or of the rectum, &c., it will be unnecessary to say more than that treatment which is suited to the primary complaint will embrace all the necessities arising from the prostatic complication.

CHAPTER IV.

SUPPURATION OF THE PROSTATE.—ABSCESS, ACUTE AND CHRONIC.

Results of Inflammation—Abscess—Diffuse Suppuration—ACUTE AND CHRONIC ABSCESS—Morbid Anatomy of Acute—Of Chronic—Symptoms—Treatment o Acute—Chronic Abscess—Cases—ULCERATION—Pathology of.

AN attack of acute inflammation may be followed not merely by chronic inflammation and induration, varying in degree and in tendency to persist, but, especially when neglected or occurring in a naturally weak or delicate constitution, in suppuration of the organ. And suppuration may take place either as an acute action at a very early period in the case, or subsequently after a long persistence of chronic inflammation; constituting in the first acute, and in the second chronic abscess: it may also occur in a diffused manner among the tissues of the organ.

The existence of suppuration in a diffused form, and not in that of localised and limited deposits, is rare, and occurs only, as far as I have observed, in cases of acute inflammation affecting the bladder and prostate, and following long unrelieved retention of urine from organic disease, or surgical operations upon the urethra or bladder.

Morbid Anatomy of Acute and Chronic Abscess.—It has been already mentioned that the prostate may be the seat of numerous small abscesses, apparently commencing in suppuration of the glandular crypts; that these may dilate, coalesce with neighbouring crypts, and so lead to the formation of cavities varying from the tenth to the fifth of an inch in diameter. But abscess may form in the prostate by a different course of events.

Acute abscess of considerable size sometimes forms rapidly in acute prostatitis, and rapidly discharges itself, most commonly by the urethra. It is exceedingly rare to have an opportunity of dissecting such a case, because resolution takes place, or, at all events, the patient does not succumb, or, if he ultimately does so, almost never during the acute stage of the complaint. Consequently, it is mainly from explorations made during life that we can ascertain anything of its morbid anatomy. The prostate examined by rectum feels full, tense, and much larger than natural. Suddenly, a discharge of matter by urethra taking place, it becomes somewhat smaller, and much less tense. Other signs, both objective and subjective, but not anatomical, existing to confirm the diagnosis of prostatic abscess, the fact of its existence in the substance of the gland is established; and its healing is equally so, since I have examined subsequently patients who have been so affected, and have verified the fact of recovery, some undue hardness and increase of size usually existing for a long period of time afterwards.

Recently, however, the rare opportunity of dissecting a case offered itself in one of the metropolitan hospitals. A man, aged twenty-five, was admitted as a medical patient, with fever and pain in the loins, coming on within fourteen days from the commencement of a severe gonorrhœa. He was unable to pass urine, and his water was removed by the catheter. He gradually sank on the eighth day after his admission. At the autopsy pus was abundant in the urethra; the mucous membrane, however, was only moderately injected in places. A large abscess was found between the rectum and bladder, and continuity of passage existed between it and the floor of the prostatic urethra, where it opened by two large orifices close to the verumontanum. It had produced destruction of a considerable portion of the prostate gland itself, but parts not destroyed seemed tolerably healthy. Whether, however, this abscess was truly prostatic at the outset, or periprostatic, it would still be difficult to decide. It largely involved the prostate, however, and is therefore illustrative of the present subject.

Prostatic abscess may assume a chronic condition in a variety of ways.

1st. The acute abscess above described may not heal, but may assume, and continue in, the chronic condition.

2nd. Abscess, never acute in its character, may slowly form in the prostate as the result of chronic inflammation in it, or in the neighbouring parts.

3rd. A tubercular deposit in the prostate may soften and be discharged, a chronic abscess resulting.

4th. Abscesses may occur from the irritation of a foreign body, such as calculus, embedded in the prostate; or in the midst of malignant growths.

In examples of the first and second kinds I have seen, in a few instances, a cavity capable of holding from two to three drachms of fluid, situated in the prostate gland, and occupying either lobe, or, partially, both. The walls of the cavity are composed of a thick layer of organised material, with ragged flocculent surface, and pus adhering. The colour is grey or grey-slate, the same tint pervading a thin layer of the prostatic structure itself lying adjacent to the abscess, then shading off into the natural aspect. Sometimes a large proportion of the proper structure of the prostate has disappeared, as the effect of the abscess; indeed, occasionally, almost the entire organ has been destroyed under these circumstances. I possess two examples, in which, nearly the whole of the prostatic substance being thus removed, the urethral canal traverses the hollowed gland, being continuous, nevertheless, with the membranous urethra on the one hand, and with the bladder on the other. This condition is shown at fig. 5, drawn from one of them when recent: the subject of it being that of a man under my care at the Marylebone Infirmary. The case is recorded in the 'Pathological Trans.' vol. v. p. 208, and at the end of this chapter, with another example of the same disease. An excellent example of this somewhat rare condition exists also in the Museum of the College of Surgeons, Edinburgh, No. 2090, XXXII. c.

In an example of the third kind, the walls of the cavity present similar appearances, and it occupies usually portions of one or both lateral lobes; but portions of pale yellowish, or greyish-yellow, curd-like matter, mixed with a little pus, may adhere to the walls, or may, indeed, fill the cavity if not discharged during life. These conditions are of rare occurrence: see Chapter XVII., on Tubercle of the Prostate.

Fourthly, abscess may be associated with prostatic calculi from the irritation produced by the foreign body. The membrane-like envelope which lines the cavity in which the calculus is situated may become with inflammation a pus-secreting structure. Small collections of pus are sometimes met with in making sections of encephaloid or soft sarcoma of the prostate; but these need no special description.

Symptoms.—The occurrence of suppuration, as has been before stated, may be suspected when after the first six or seven days the acute symptoms do not subside, when the pain and difficulty of micturition and defæcation increase, if rigors occur, and the patient is very restless and feverish, complaining of great tension and of a pulsating sensation in the perineum and at the neck of the bladder. The fact is determined if, by rectal examination, the swelling there increases, and communicates to the tip of the finger a sensation of softness and elasticity, in place of the firmness and resistance which were noted before. The act of examination also, although necessary, is excessively painful, and should be very gently and slowly performed. Pressure in the perineum may also reveal tenderness and fulness in that situation. The natural course of abscess in the substance of the prostate is generally spontaneous evacuation by the urethra, often immediately after the passing of a catheter, rendered necessary by the patient's condition. Occasionally the matter is evacuated by the rectum, as in the case of a gentleman recently under my care, when two ounces of healthy pus were suddenly evacuated while the patient was at stool, a smaller quantity being evacuated every day for some time after from the opened cavity of the abscess. In this case the enlargement, which was very considerable, was due to a previous attack of prostatitis, complicated with obstinate and narrow stricture of the urethra. The spontaneous evacuation of matter by the rectum is perhaps less favourable, generally speaking, than by the urethra. It may be followed by a troublesome urethro-rectal fistula, but not necessarily, or even usually so. On the other hand, although the opening of the prostatic abscess into the urethra may soon close, the walls of the cavity having granulated and united by adhesion, yet, if this does not take place, the sac may remain open, and become a receptacle for urine, giving rise to fresh collections of matter around, from the inflammation so produced. Extravasation rarely, if ever, has to be feared, the parts exposed to urine being defined and thickened by exudation matter.

Treatment.—This mainly consists in watching the course which the abscess takes, and evacuating the matter, when it presents itself either in the rectum or in the perineum, the latter circumstance being very rare. In the rectum, if a fluctuating tumour is manifest, it is easily punctured. But the deep perineal abscess, often formerly regarded as prostatic in its origin, is probably rarely so; but rather the result of extravasation of urine behind the deep fascia. If, however, deeply seated abscess in this position is manifest, it should be opened without delay.

The incision requisite must be made with boldness, in the median line, in the known direction of the prostate. The forefinger of the left hand having been introduced into the bowel, a long, straight, and narrow bistoury, the cutting edge of which is upwards, should be thrust into the raphé, about three-quarters of an inch anterior to the anus in the known direction of the swelling, and the incision enlarged in a straight line upwards, to a slight extent, so as to give a free opening for the discharge of matter. The depth to which such an incision must be carried cannot be less than an inch and a half, it may be two inches; less than the former will be probably useless, and if so, unnecessary and injurious.

But the surgeon should be well satisfied that there is a collection of matter in the situation referred to, before he decides on making this attempt to evacuate it by artificial opening. In cases of doubt, we must await the result, confining ourselves to palliating the symptoms which arise, and not unfrequently nature will clear up the case by discharging the pus through the urethra. Under the various circumstances met with, it must be confessed that occasionally a case will present itself in which the indications for action are not very marked or decided. At the same time little or no risk is incurred by a simple deep puncture of the perineum, and it should not be delayed if symptoms are at all threatening. The large experience now obtained of perineal incision for the purpose of exploring the bladder shows how valuable, and at the same time how harmless, the proceeding is.

Occasionally, a prostatic abscess has been observed to come forwards spontaneously by the perineum. Such, at least, is stated to be the case. It is contrary to the principle understood generally to hold good with respect to the course of matter confined in all parts of the body, viz., to seek exit in the direction of least resistance; for in the case supposed, the matter must find its way through the deep perineal fascia. It is not improbable that in some of the alleged cases this barrier was behind the abscess, and not between it and the surface at all, a distinction not always easy to establish. Very rarely prostatic abscess may burst into the peritoneal cavity. Mr. Adams gives an example of this in a case of tubercular prostate.[1] It is probably a very rare occurrence under any other circumstances.

Chronic Abscess.—The discharge of matter from an acute abscess of the prostate is sometimes followed by long-continued suppuration. Chronic abscess may arise by itself, although not very frequently, either with or without any existence of tubercular deposit; but is much more commonly the result of confirmed or neglected stricture of the urethra. It is by no means always easy, or even possible, to diagnose the existence of a chronic abscess of the prostate during life; in some instances, however, it may be recognised by rectal examination. A part of the prostate may yield sensation of fluctuation to the finger in the rectum; and if this is obvious in a case where the history and symptoms have been such as to render the occurrence of chronic abscess there probable, it is advisable to take means for evacuating it. This may be done by passing a grooved sound into the bladder, and making an incision into the spot detected. It by no means necessarily follows that we are to open the urethra in these cases, although it has frequently been done without producing any mischief in the shape of fistula afterwards. Some interesting illustrations of this fact were formerly observed by Mr. Meade, of Bradford.[2]

When we are in doubt as to the physical signs of abscess, and only suspect its presence, the indications are almost solely those which relate to the patient's general health, and this, as in almost all cases of chronic abscess in other parts of the body, requires care. The general health, and its promotion by attention to digestion, are primary objects of supervision, while cod-liver oil, tonics, and pure air, especially at the seaside, will perhaps aid the progress of the case. Chronic abscess very rarely calls for an incision from the perineum, although this has been referred to, and the less instrumental interference takes place in the urethra the better. Abscess in this situation heals very slowly, since, after it has broken, urine is apt to pass into the cavity; maintaining irritation and pain, and hindering the reparative process.

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[1] *Anat. and Dis. of the Prostate*, 2nd ed. p. 128.

[2] *Med. Times*, Oct. 20, 1860. A paper on Inflammation and Abscess of the Prostate Gland.

CASE NO. I.

PROSTATITIS AND CYSTITIS AFTER INTEMPERANCE AND EXPOSURE TO COLD, RESULTING IN ABSCESS OF THE PROSTATE.

J. P., aged 54. Oct. 1854. A man of intemperate habits since twenty years of age. Two or three attacks of gonorrhœa when young. For some years past has had occasional pain when passing water, but nothing which he considered serious.

Six months ago exposed severely to wet and cold, followed by retention of urine, and was relieved by the catheter. He was unable to pass water without an instrument after this, and became an in-patient of St. Mary's Hospital. Some time after he was discharged, passing his urine by the catheter, which he had been taught to pass for himself.

Dec. 23, 1853.—He was admitted under my care at the Marylebone Infirmary, requiring to pass water every hour, which he can do only by means of the catheter; and he suffers severe pains about the perineum, pubes, and loins if the relief is not afforded. No tenderness in hypogastric region; nothing particular noted after rectal examination; no tenderness within reach of finger there. General condition weak.

No. 8 catheter passes easily into his bladder. It is noted that some urine flows before the instrument passes quite six inches; after passing it farther, more can be drawn off; no calculus, but a tender and rugose condition of the bladder is detected.

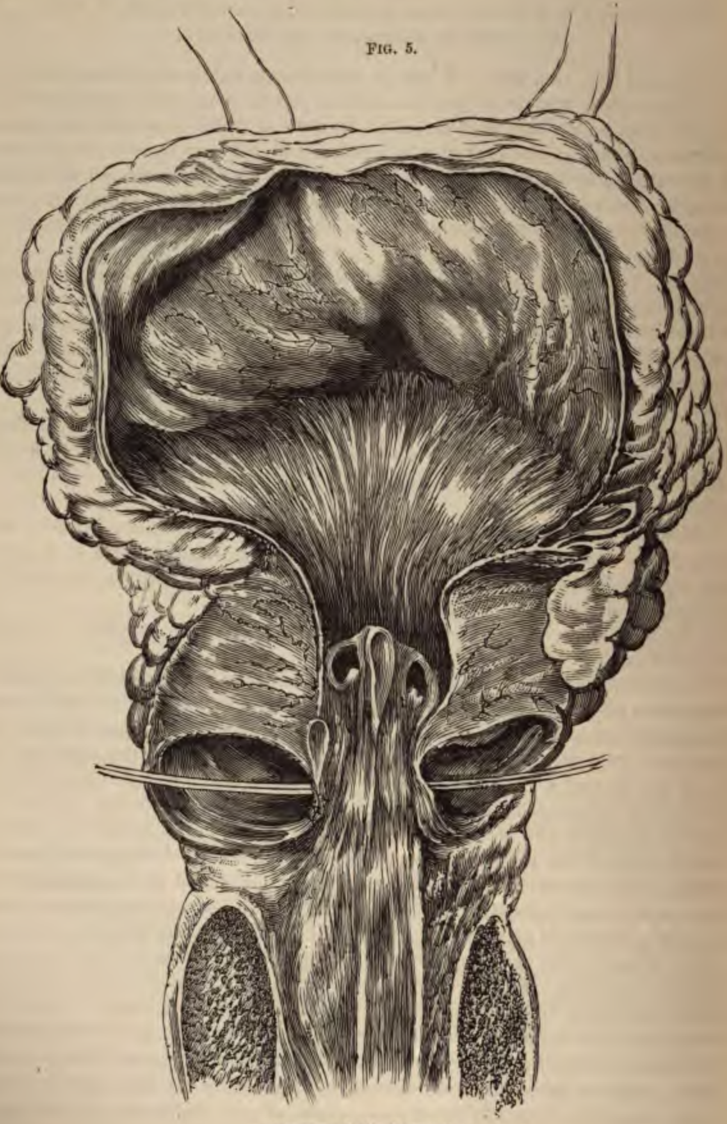
During the following three months, he notably improved after injecting the bladder with solutions of nitrate of silver, increased from half a grain to 1 grain to the ounce. He retained his urine three hours, the mucus disappeared, and the pus greatly diminished.

In April, 1854, he succumbed to an attack of pneumonia. Autopsy fourteen hours afterwards.

On removing the penis, bladder, ureters, and kidneys entire, and laying open the urethra from above, it was found healthy as far as to the prostatic portion. Here a large cavity presented itself, capable of containing 10 or 12 drachms of fluid. It undermined the mucous membrane of the urethra, opening into the canal by an aperture the size of a florin, situated on the upper part; thus the floor of the urethra alone remained, forming a kind of bridge through the cavity, which extended below, above, and on either side of it (see fig. 5). This cavity is bounded by the capsule of the prostate, the substance of the organ having disappeared. Passing through the cavity is the right ejaculatory duct found to be dissected out entire. It is dilated, admitting a No. 9 catheter until it leaves the prostate, when it opens into the sac of an abscess. The left duct has disappeared, but the opening by which it entered the urethra remains. On examining the base of the bladder, a sac is seen occupying the entire interval between the two vasa deferentia and the vesiculæ seminales, but apparently not communicating with either. There is, nevertheless, a free communication between this cavity and the urethra by means of the right ejaculatory duct, for the catheter above mentioned passed directly into it. This cavity is capable of containing about 6 drachms of fluid, and may be either the sac of an abscess in the cellular tissue, or one originating in the right vas deferens itself. The latter supposition seems to be more probable from the appearance of the parts.

The walls of the bladder are much thickened, and the mucous membrane is much injected, exhibiting reddish, brownish, and greenish tints, and bright crimson arborescent injection in patches. The ureters are a little above the natural size. The kidneys are above the usual size, and present the appearance of interstitial deposit, with much fat, under the microscope.

FIG. 5.



Abscess of the Prostate.

This case and the following are already referred to as having been exhibited at the Pathological Society, and being excellent types of the prostatic abscess, are given here, together with the drawing made from the part when fresh.

CASE No. II.

LONG-STANDING URETHRAL OBSTRUCTION, INCONTINENCE. ABSCESS OF PROSTATE AND RIGHT VESICULA SEMINALIS.

J. T., aged 73. Admitted to Marylebone Infirmary, under my care, May 23, 1854. For many years he had much difficulty in micturition, and incontinence; beyond this no information can be obtained, as he is evidently fast sinking, apparently exhausted by disease.

His urine passes constantly, and he keeps a vessel in bed according to his habit. There is a large opening in the scrotum, which gives exit to much pus. The man is almost pulseless and evidently dying.

Autopsy.—Bladder much thickened; very rugose; mucous membrane exhibits fine reddish-brown and few slatish tints. On laying open the urethra, a part in the bulb was found with thickened walls, narrowed, and much lymph deposited on the surface, partially fixing two calculi, each about the size of a small pea. In the prostatic part was seen an opening into the sac of an abscess, formed by the capsule of the prostate, precisely like that just described in the preceding case, with the floor of the urethra bridging over it. Behind it was another abscess, involving the right vesicula seminalis. Both kidneys much diseased, and containing large cysts. As far as the abscess of the prostate is concerned, fig. 5 represents the condition very correctly.

Ulceration of the Prostate.—The urethral mucous membrane of the prostate suffers ulceration as a consequence of previously existing lesions. Pure idiopathic ulceration is probably extremely rare. Thus, when an abscess opens into the urethra, the tissues around become ulcerated, and the opening remains during a certain space of time; such cases have chiefly furnished the examples of ulceration described by authors. A like condition exists in the discharge of tubercle, or in the sprouting of malignant growth. A slight tubercular deposit into the mucous membrane of the prostatic urethra has been noted as leading to ulceration there: more commonly it affects the lining of the bladder and the vesical orifices of the ureters. So also, after the impaction of a calculus, either entire or in the form of a fragment, ulceration may take place. After long-continued and aggravated stricture of the urethra, followed by dilatation of the canal, passing through the prostate, and thinning of its mucous membrane, I have not unfrequently observed chronic ulceration affecting it and the subjacent tissues. It may be occasioned during urinary retention and extravasation. I have seen cases in which ulceration of the prostatic urethra and neck of the bladder has occurred from maintaining a catheter in the urethra and bladder during too long a period, for the sake of treatment. An example of this may be seen in the Museum of the Royal College of Surgeons, London; No. 2551: it is described by the catalogue as a 'patch of lymph where a catheter rested.' Ulceration may occasionally be found existing after any long-continued vesical disease in the elderly and enfeebled, and especially in paralysed patients, from cerebro-spinal disease or injury. It may go on to sloughing, with considerable destruction of prostatic tissue in any of these cases.

After all, there is nothing special in these forms of ulceration as affecting the prostate; it is a morbid action alike affecting its tissues and those of all other soft parts in the organism when their vitality is impaired by certain morbid conditions local or general.

There is no specific form of ulcer affecting the prostate; nothing peculiar to it as an organ, as there is in the stomach, for example. There is no ground either for believing it to be the subject of any specific chancrous ulceration, except in those very rarely observed instances in which such an affection has made its way along the urethra, and even into the bladder.

Further, as ulceration almost never exists apart from some other morbid condition of the prostate, bladder, or urethra, and never except as a consequence of some prior lesions there, it is manifestly impossible to offer any description of the symptoms characteristic of it. Neither in relation to symptoms nor to treatment of ulceration in the prostate, is there any specific indication beyond that of treating the general and local symptoms as they arise, in accordance with principles already laid down under the head of acute and chronic inflammation, in the preceding chapter; and by removing the cause, if it be a removable one, such as stricture of the urethra, or calculus of the bladder or of the prostate, which has given rise to the ulceration.

CHAPTER V.

THE ENLARGED PROSTATE OF ELDERLY MEN, SO CALLED HYPERTROPHY; ITS EXTERNAL ANATOMY.

External Characters of Enlarged Prostate of Elderly Men—Parts chiefly affected—Amount of Enlargement produced—Changes in Urethra and Neck of the Bladder which result—Varieties in Form and Size thus occasioned.

Enlargement of the Prostate, commonly called 'hypertrophy.'—Among men who have passed the prime of life, or, to speak more definitely, those who have passed the fifty-fifth year, or thereabout, as far as the most carefully prosecuted researches tend to show, a peculiar affection of the prostate is commonly, but by no means generally, met with. The organ enlarges by a slow and gradual process, and mostly produces more or less obstruction to the discharge of urine from the bladder. This enlargement, as will be seen when we consider the details of the subject, is not a product of inflammatory action, nor is it caused by any results of inflammation corresponding with those produced by the action of inflammation in other organs; but it is due to an increased formation of tissues naturally present in the prostate itself, or analogous thereto.

Hitherto it has been the custom to regard all forms of the enlargement referred to as hypertrophy of the prostate, and invariably to denote them by that term. Thirty years ago, when occupied with an extended anatomical examination of the prostate, I came to the conclusion that all enlargements which were neither malignant nor inflammatory could not be regarded as hypertrophy in the true meaning of that word. Hence I avoided the use of the term, and employed that of 'enlargement' as the title of my first work on the subject. Subsequently I adopted the designation 'hypertrophy,' finding that it was universally used, and that it sufficed for the present for all practical purposes. But the more exact knowledge of morbid structure and action which has been acquired since the date named, tends to corroborate the view that one common form at least of that gradual enlargement which occurs after middle life is inappropriately spoken of as hypertrophy. Hence the general term 'enlargement' will again be used, in this volume, to comprehend the several varieties, since that character is common to all of them. Their intimate or structural peculiarities will be fully considered in the next chapter.

It will be convenient to study the morbid anatomy of this enlargement under the following heads:—

I. The external physical characters belonging to the enlarged prostate of elderly men.

II. The parts of the prostate chiefly affected by it.

III. The amount of enlargement produced.

IV. The anatomical changes in the prostatic urethra and neck of the bladder, which take place in consequence.

I. External Physical Characters.—It has been already seen that it is scarcely possible to describe, in exact terms, the limits, in respect of either weight or size, of a healthy prostate, any addition to which must necessarily be regarded as indicating enlargement. By some observers a weight exceeding six drachms has been regarded as always abnormal. Absolute proof of this appears to be wanting, but I think that seven drachms may fairly be considered as indicative of enlargement when found in a subject of about 60 years of age. I have never seen a prostate of that weight which did not present other indications either of external physical, or of internal structural changes, corroborating the suspicion aroused by the fact of weight. On the other hand, I have seen a prostate weighing less than six drachms, which afforded unmistakable evidence of the existence of enlargement in the conformation, &c. The possibility of this can be easily understood when we recollect that in some individuals a prostate of less than four drachms is of normal size.

The first external character generally observable in a prostate thus affected is undue fulness, and an unnatural tendency to rotundity. Almost always the gland is thicker than natural. Neither the length nor the transverse measurement may be necessarily increased, while the measurement from before backwards (erect position) is almost invariably increased. Hence the fulness remarked. The surface markings described in the section relating to healthy anatomy disappear; the external indications of bilobular formation diminish. If a section now be made through the anterior part (anterior commissure), so as to lay open the urethral canal longitudinally, the lateral lobes appear fuller than natural, and to protrude a little into the passage, so that their opposed sides press lightly upon each other.

In a more advanced stage, the enlargement is more considerable; either lateral lobe may predominate, or the portion behind the verumontanum, 'median portion,' may be largely developed. The form or outline of the gland may be very irregular and unsymmetrical from the presence of projecting portions, which may result from two conditions—first either lobe may protrude greatly beyond the others, as just alluded to; or independent tumours may be found embedded in it, or partially so, springing from the surface, and forming very salient projections in any direction, most commonly, however, towards the cavity of the bladder. When these are present and largely developed, the original form of the prostate is often obscured, and a mass of rounded prominences, sometimes numerous, and generally irregularly placed, surrounds the neck of the bladder. See fig. 16, p. 76. In any of these conditions the urethra, as it passes through the prostate, may be diverted a little right or left of the middle line through pressure by the most enlarged part; the prostatic portion may be increased in length (necessarily with the increased length of the prostate itself), and the antero-posterior diameter of the canal is often much increased by reason of the enlargement of the lateral lobes.

In external colour there is no difference ordinarily observed; unlike to malignant enlargement, where new growth with increased vascularity is accompanied by yellow, red, and violet tints in some variety of shade.

In consistence, there is usually some change; the enlarged prostate is commonly more firm and dense to the touch than the normal organ; and a sensation is perceived, suggesting structures firmly bound within a tight or stretched envelope, a condition which becomes apparent if section is made, when the contained parts protrude, the cut surfaces becoming more or less convex. In a few exceptional examples this may not occur, but it is undoubtedly the rule.

II. The parts of the prostate which are chiefly affected by enlargement.

There is no part of the prostate which may not be so affected. The lateral lobes, the median portion, or middle lobe, the anterior and posterior commissures, are all capable of exhibiting this change, although in different degrees, as regards both their several liability to be affected, and the extent which development may attain when the affection has taken place.

Many authors have attributed the earliest tendency to enlarge to the median portion ('middle lobe'), as well as to regard this as the source of the most considerable development in point of size. As regards locality, it is doubtful whether the median portion exhibits the change at an earlier period than the lateral lobes; but, as regards the rate of development, the former, perhaps, progresses more rapidly than the latter. At the same time, most of the preparations contained in four of the principal museums of London, including that of the Royal College of Surgeons, each carefully examined by myself and numbering 123 specimens, exhibit about an equal development in size of at least three portions of the organ; that is, of the lateral lobes and median portion, while in many the anterior commissure is correspondingly enlarged. I have classified the preparations referred to in distinct groups, marked by the direction or situation in which the enlargement is chiefly manifested, a method which will afford the means of obtaining a comprehensive view of the question under consideration. The first group consists of the four varieties of form which most commonly occur; the second group of three varieties of form which are decidedly rare.

Common forms of the affection.

I. General enlargement of prostate, that is, both lateral lobes and median portion pretty equally enlarged, is present in 74 preparations of the 123.

II. General enlargement of prostate, but the median portion enlarged in greater proportion: in 19 preparations.

III. General enlargement, but the right lobe predominating, and very decidedly larger than the left: in 8 preparations.

IV. General enlargement, but the left lobe predominating, and decidedly larger than the right: in 11 preparations.

Uncommon forms of the affection.

V. The lateral lobes only enlarged: in 5 preparations.

VI. The anterior commissure only, or chiefly enlarged: in 3 preparations.

VII. The lateral lobes and anterior commissure enlarged, not the median portion: in 3 preparations.

The several series of preparations tabulated in Chapter II. furnish results very closely corresponding with the foregoing, including two series of 64 preparations by myself, and another, continuing my own observations, by Dr. Messer, formerly of the Royal Naval Hospital, Greenwich. These results are more valuable than those obtained from museums, because they consist of average and not of selected specimens. Among 100 prostates from subjects of 60 years old and upwards, Dr. Messer found 35 which were enlarged. He reports that in 17, or about one-half of the number, 'all these lobes were pretty equally enlarged;' that in 14 both lateral lobes were chiefly affected; that in one case the left lateral and middle lobes were mainly affected; that in one the right lateral lobe was mostly; that in one the left lateral lobe was alone; and that in one the middle lobe ('median portion') was chiefly affected; in all 35.[1]

(α) That the lateral lobes and the median portion, or middle lobe, are equally liable, or nearly so, to be affected by enlargement.

(β) That the posterior commissure is generally involved with the preceding parts, and in proportion to the extent which they manifest.

(γ) That the anterior commissure is not frequently affected, but nevertheless is so in rare instances.

(δ) Lastly, that development takes place at about an equal rate in each of the three principal divisions; in some cases the lateral lobes appearing to enlarge more rapidly than the median portion; in others the contrary effect is found, and perhaps in a rather larger number of cases than in the preceding.

III. The amount of increase in size and weight attained in the process of enlargement.

It has been shown that a weight of about 400 grains, or nearly 7 drachms, must be regarded as abnormal, the average weight of a healthy prostate being about 270 to 300 grains, or 4¾ drachms. Now the weight may be considered a very fair index to size, and is sufficiently so for all conceivable practical purposes, since the amount of increase in one corresponds (on trial) very closely with the amount of increase in the other. Where, as often happens, the structure is denser than in the healthy prostate, a slight increase may be allowed in calculating the true amount of hypertrophy. However, it is scarcely conceivable that such exactness can be required in any given case.

Taking weight, then, to correspond with the amount of abnormal enlargement, and as very fairly indicating the increase in size in all cases, it is unnecessary to record rectilinear measurements of so irregularly formed a body as an enlarged prostate commonly is, but to furnish, under the topic here considered, the amount of augmentation in weight which the enlarged prostate ordinarily attains, and that which it may occasionally and extraordinarily exhibit.

My own dissections (see table) afforded 20 examples of enlarged prostates, from persons at and over 60 years of age. Those only are reckoned to be so which presented physical evidence of the change, without regard to weight. These 20 ranged from 6 drs. 20 grs. to 18 drs. The mean weight is about 9 drs. 15 grs. The most common weight is from 7 drs. to 10 drs.

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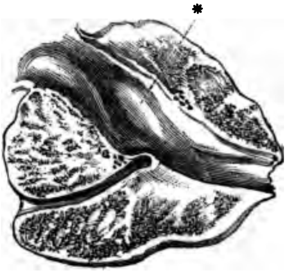
[1] See a paper by Dr. Messer—*Trans. Med.-Chir. Soc.* vol. xliii. p. 153.

FIG. 6.



A good example of the earliest stage of senile enlargement is shown at fig. 6; it was taken from a subject aged 62 years; weight of prostate, 6 drachms 5 grains. The portion lying above the duct is protruding upwards. A small fibrous tumour was found in each lateral lobe; and one of them may be seen projecting a little into the urethra, and rendering the mucous membrane slightly prominent (indicated in the figure by an asterisk).

Dr. Messer's dissections afforded 35 examples of enlargement from persons at and over 60 years. The 35 ranged between 6 drs. 15 grs. and 48 drs. The mean weight was 15 drs. 2 grs. The most common weights ranged between 7 drs. and 14 drs.

From these data it may be inferred that the most usual weight for an enlarged prostate, which has existed some ten or twelve years, is between 9 and 12 drachms, or more than double the natural size. Nevertheless, many cases exceed this limit considerably. The largest example of this condition known is 9 or 10 ounces. The size of such a mass, forming a preparation now in the museum of University College, is nearly that of a cocoa-nut; but such an example is extremely rare. In malignant disease these limits are exceeded.

Other observers, including John Hunter, Sir E. Home, Mr. Howship, Sir Chas. Bell, Sir B. Brodie, Mr. Stafford, Dr. Gross, Mr. Adams, Dr. Hodgson, MM. les Drs. Civiale, Mercier, Leroy d'Etiolles, and Rokitansky, have estimated the extent of deviations in size in general but not in precise terms; and as it does not appear that they have pursued any exact researches in relation to this question, their observations thereon need not be quoted.

A large orange is the simile furnished to describe the largest example observed by Mr. Howship.[1] Sir Charles Bell speaks of one 'as a monstrous enlargement of the prostate gland, probably the largest in this country.'[2] This is now in the museum of the College of Surgeons, Edinburgh (No. 2071, xxxii. B), and may be described as having the volume of a medium-sized cocoa-nut. Dr. Gross describes a specimen as weighing 9 ounces.[3]

I had occasion to perform suprapubic puncture of the bladder for retention of urine in a gentleman aged 62, in whom the prostate was at least as large as a full-sized cocoa-nut, but I had no means of making any exact estimate of it after death.

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[1] *Diseases of the Urinary Organs*, p. 299. Howship. London, 1823.

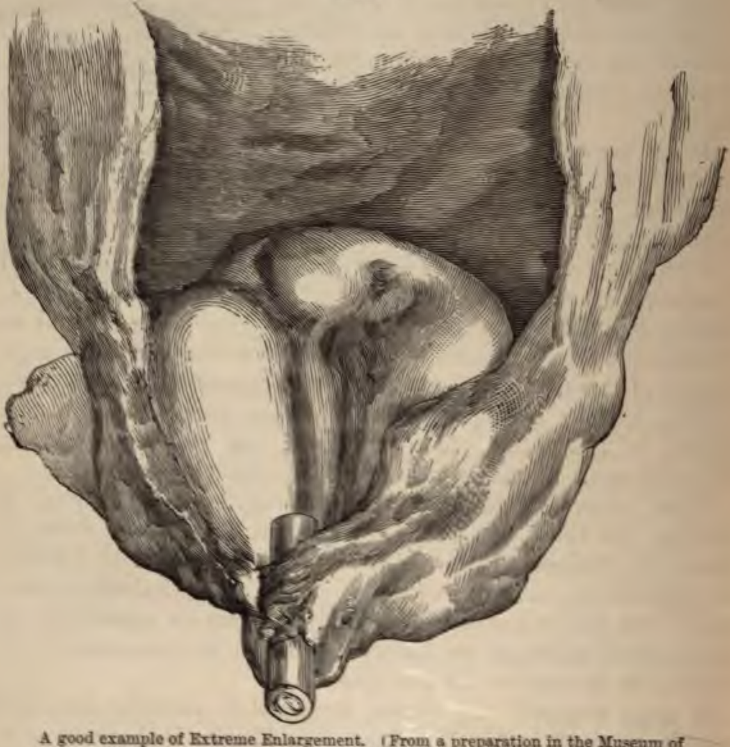
[2] *Treatise on the Diseases of the Urethra, &c.*, p. 423. London, 1822.

[3] *Urinary Organs*, 2nd ed. p. 688.

IV. The anatomical changes in the prostatic urethra and neck of the bladder, induced by the enlarged prostate.

The most important result of enlargement, at all events in any of its four common forms, is obstruction to the flow of urine. Very rarely is it otherwise, although there appear to be some cases, few and exceptional, in which the condition of the vesico-urethral orifice is so altered, that the bladder is unable to retain the urine, which consequently runs off as fast, or nearly as fast, as it enters the viscus from the ureters; a subject which will be more fully discussed hereafter. Admitting, then, that the result almost uniformly met with is obstruction, producing more or less retention in many instances, it is obviously an important part of the present inquiry to ascertain the influence of enlargement upon the form, size, and direction of the urethra.

FIG. 7.



A good example of Extreme Enlargement. (From a preparation in the Museum of University College.)

The first effect to be noted is one which is common to all the first four forms of enlargement: viz., increase, sometimes considerable, of the antero-posterior diameter of the prostatic urethra. Associated with this is diminution of its lateral or transverse diameter; so that the canal becomes a narrow or chink-like passage, instead of one which, when distended, is of about equal diameter in every direction. The lateral lobes, increasing, not only encroach laterally upon the canal itself, but gradually carry upwards that portion of the urethral wall which is constituted by themselves, and that to such an extent that I have seen the slit-like opening produced by the antero-posterior transverse section in such a case measuring three-fourths of an inch.

The length of the prostatic urethra is also materially increased by the same forms of enlargement. The increased magnitude of the encompassing body in every direction involves an addition to the length of the passage which passes through it. But it is often rendered somewhat tortuous also, which further contributes to its length. In some of the preparations referred to above the urethra measured three inches from the orifice of the bladder to the membranous portion, instead of one inch and a quarter, which is about the normal length.

The next effect is a deviation from the natural direction; and this varies with each form of enlargement noted. Thus, where there is enlargement of, or outgrowth from, the median portion, the form most generally present, a change in the direction usually commences about the middle of the prostatic urethra, its posterior wall being carried upwards, or upwards and forwards, in the erect position of the body, producing a more or less angular curvature in the place of a nearly straight line. Examples of this deviation are shown in the adjoining figures, which, although diagrams, represent in profile the form of the actual specimens from which they were taken after death.

FIG. 8.

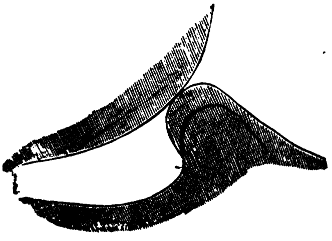
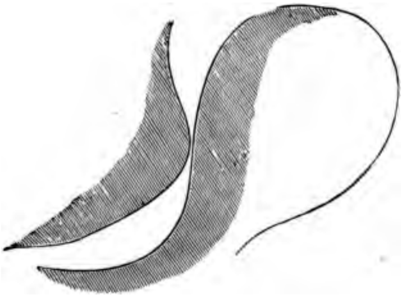
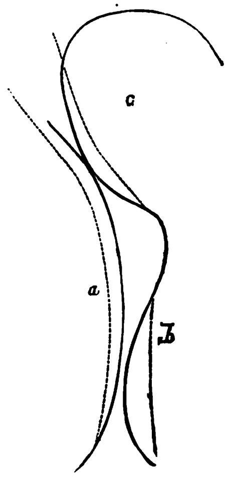


FIG. 9.



The direction, in early stages of enlargement, is usually more or less that of a simple curve, but in more advanced stages it may be almost angular, so that in some instances a complete step has to be surmounted at the neck of the bladder before an instrument will enter the cavity (figs. 8 and 9). Now, when associated with this undue development of the median portion, there is a predominating enlargement of either lateral lobe, it is obvious that the lateral direction of the canal will be also changed. Thus, if the right lobe predominates, there will be a lateral curve of the urethra, the convexity of which is presented to the left, and *vice versâ*. And as the predominating lateral lobe is almost always found in connection with a large median portion, and is usually more or less blended with it, the direction of the urethra will be upwards and to the right, or to the left, as the case may be (fig. 10). Sir E. Home, up to the date of publication of his first volume on the prostate gland, had never seen predominating enlargement of the right lateral lobe, and he inferred, as a rule of some importance in relation to the introduction of catheters in enlarged prostate, that such an enlargement, and by consequence, that a deviation of the canal to the left either did not occur, or was extremely rare. He met with an enlarged right lobe, however, before the publication of a second volume on the same subject, but still regarded it as uncommon, and in this light it has been viewed, I observe, in the latest works on this subject. There is, however, no ground for supposing that there is any difference in the liability of either lobe to the affection, since among the existing specimens the predominating lobe is to be found in nearly equal numbers to the right and left respectively. But in the absence of any predominance of a lateral lobe, where the median portion is largely developed, a similar kind of deviation is often met with, only it is not necessarily confined to one side, but may exist equally on both. The vesical end of the urethra being divided by a large median outgrowth of pyriform shape, a passage is left on either side of it, giving to the canal there the form of the letter Y (figs. 11 and 12). In these diagrams, drawn, like the foregoing, from actual specimens, the line which the catheter must take is indicated by dotted lines. And the degree of vertical direction associated with it frequently depends upon the amount of mucous and sub-mucous tissue drawn up by the growth, on each side of which, at the vesical orifice, it forms a kind of semicircular bar. It

FIG. 10.



a. Right lobe of prostate, considerably enlarged.
b. Left lobe, less so.
c. Tumour from median portion blended with left lobe, and consequently deflecting the urethra to the right side. The course which an instrument must take in such a case is indicated by dotted lines.

is hardly necessary to allude to the importance of calling to mind, when instrumental aid is required, the frequency with which lateral deviation is found to exist in largely developed forms of prostatic obstruction.

FIG. 11.

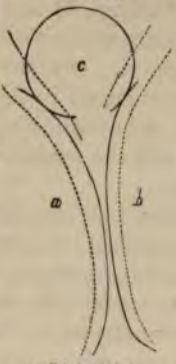
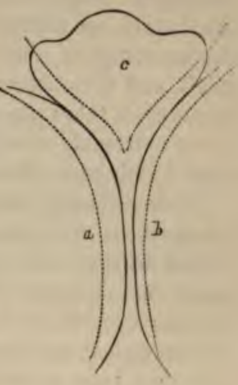


FIG. 12.



a. Right lobe.
b. Left lobe.
c. Median portion ('middle lobe').

FIG. 13.

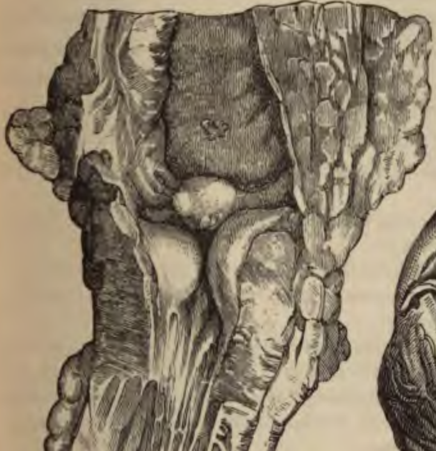


FIG. 14.

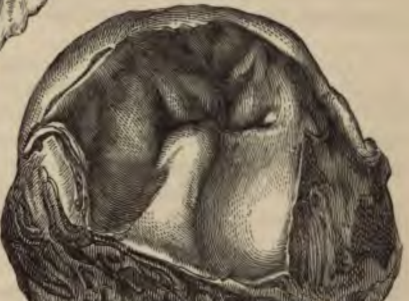


FIG. 13.—Part of the bladder and the prostate, from a man aged 65. The lateral lobes are about equally enlarged. The eminence at the neck of the bladder was constituted by three or four small tumours originating in the median portion. Obstruction to the outflow of urine during life was very considerable.

FIG. 14.—Internal meatus of urethra as seen from the bladder: two or three small tumours producing nearly total obstruction.

The next deviations are those to be observed in the form of the internal meatus, or vesico-urethral orifice, which in its healthy condition is too well known to require description. When, however, the posterior median portion is predominant, the vesico-urethral orifice acquires a crescentic form, the convexity of which is directed upwards. When the right lobe considerably exceeds in size the left, the crescent has its convexity to the left side, and so on. In some preparations, where two or more irregularly enlarged lobes are combined, the orifice is very much distorted, presenting an elongated and tortuous outline. Sometimes it appears to be overlapped altogether, when an outgrowth from the posterior median portion affects a valvular form, or has a narrow peduncle. In these circumstances, which, however, are not very commonly met with, the valvular portion appears to be forced against the neck of the bladder by the effort of micturition, and the obstruction rendered still more complete. Figs. 13 and 18 (pp. 61 and 108) show this condition on a small scale, not unfrequently met with, but in both cases the effect was almost complete obstruction. Occasionally the tumour may be very small, and thus becomes engaged in the internal meatus, so that the same result takes place; as in the instance represented at fig. 14, where it was extremely small, and the patient was almost unable to pass any urine by his own efforts.

It occasionally happens, but very rarely, that one result of prostatic enlargement is undue patency, and not obstruction of the urethro-vesical orifice; and this circumstance, erroneously regarded as a frequent one, is supposed to explain the occasional occurrence of genuine incontinence with an habitually empty bladder.[1] Submitted to the test of extended anatomical research, the following facts appear :—First, it is very rare to find expansion of the internal meatus. Secondly, when it does occur, it is almost invariably associated with a distended bladder, proving incontestably that obstruction was present during life, and that retention, not incontinence, was the result.

The expansion of the vesico-urethral orifice, which prevents the bladder from retaining urine, is accounted for in the following manner: The lateral lobes being considerably enlarged, the tumour of the median portion, instead of projecting backwards into the bladder in the usual manner, enlarges between the hinder parts of the two lateral lobes themselves, and opens them out as by the action of a wedge, giving to the meatus an expanded and triangular appearance. I have carefully examined the histories attached to preparations exhibiting this peculiarity, and where these have been wanting have verified the existence of an hypertrophied and distended bladder, proving, therefore, that retention was the habitual condition during life, and in no instance have I been satisfied that real incontinence had been so occasioned. Anterior to the vesical orifice, it may also be observed, there is usually a sufficient degree of encroachment of the lateral lobes upon the canal to produce considerable obstruction and habitual retention of urine. I am aware that the condition and its alleged result sometimes coexist; but such cases are extremely rare.

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[1] Owing to the different modes of using the following terms, they are, in order to avoid misunderstanding, here defined :—

'Incontinence' is held to imply a condition in which the natural function of the bladder to retain urine is absent, or nearly so; the bladder cannot contain, hence is said to manifest 'incontinence.'

When the bladder is habitually distended with urine which the organ cannot expel, it is said to manifest a condition of 'retention;' and if the quantity of retained urine is so large as to force its way out through the urethra, either by night or day, without any effort of will by the patient, the retention is said to be associated with 'involuntary micturition,' or 'overflow.'

Such is the interpretation which I have strenuously supported as the logical one of these terms for the last twenty-five years, and I believed it to be generally accepted. It was that which Mercier and other leaders of the French school formerly adopted, and I see with regret that the highest authority in Paris at the present moment has recently employed the term 'vraie incontinence' to denote the overflow of urine from an over-distended bladder, because the change is liable to produce confusion on a question where perspicuity is of vital importance. It is this circumstance alone which has made definition necessary here, the subject being discussed hereafter in its proper place.

The following is an example of it. A man who died at the Royal Naval Hospital, Greenwich, at the age of 84 years, did not suffer from any retention of urine during life, yet at his post-mortem examination Dr. Messer found a prostate weighing no less than 26½ drachms; it contained many tumours. Dr. Messer makes the following remark respecting the question:—

'It may be remarked that, in cases where the hypertrophy is advanced, and the tumours tend inwards, the urethra becomes greatly expanded, and the interspaces between the rounded sides of the projections into it serve as channels for the urine to pass away by. This condition will explain, I have no doubt, the occasional absence of symptoms of obstruction in cases where the prostate is known to be considerably enlarged.'[1]

But there is another point of view from which the development of the enlarging prostate may be regarded. The tendency is, in some instances, strongly manifested in a direction towards the centre of the organ, or the neck of the bladder. In others, it appears to affect an opposite direction, to become developed rather towards its periphery. In the former, which may for brevity's sake be denominated *centric* enlargement, the outflow of urine may be very materially obstructed before the prostate has increased much in weight or size. In the latter, which may be described as *eccentric*, or peripheral, a very large development may take place, and an enormous prostate may be encountered in the rectum, and yet little obstruction to the course of the urine will be manifested. This, it is almost unnecessary to remark, is a form somewhat more favourable for the patient than the other. Thus I occasionally see a case of advanced prostatic enlargement in which the urine is expelled frequently and with difficulty, while the bladder is emptied or almost so at every act of micturition. But in such circumstances the catheter is of no service; so that the patient obtains less relief from treatment than in those more common cases in which chronic retention is more or less present, and where great advantage is derived from habitual use of the instrument.

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[1] *Trans. Med.-Chir. Soc.* vol. xliii.

CHAPTER VI.

THE INTERNAL AND STRUCTURAL ANATOMY OF THE ENLARGED PROSTATE OF ELDERLY MEN.

General characters on making section—The intimate structures in variety—Hypertrophy—Hyperplasia, fibrous and glandular—Sclerosis.

THIS subject will be considered under two heads: A. The naked eye characteristics offered to the observer. B. Those which are determined by microscopic examination.

A. The facts obtained by ocular inspection. On making a section of one of the thicker portions of the mass presented by a considerably enlarged prostate, such being usually one of the lateral lobes, certain peculiarities of appearance are observable. These may be noticed under two heads: viz., first, those common to all enlarged prostates; and, secondly, those which are met with in only some of them.

First.—Characters which are common, although in greater or less degrees of prominence, to all enlarged prostates.

When a section of the gland is made,

(*a*) The surface bulges irregularly;
(*b*) It is, also, more less parti-coloured; and
(*c*) It is striated in places with small tortuous blood-vessels.

(*a*) **Irregular Bulging.**—There is a general protruding of the cut surface of the prostate, above the level of the border of the divided capsule, a condition not seen in section of the normal organ. It is obvious, also, that portions of different size, and sometimes of spheroidal form, are more tumid and prominent than the rest; these are not always independent tumours, as will presently appear.

(*b*) **Parti-colouring.**—The cut surface of a healthy prostate is always parti-coloured to some extent, but that of the enlarged is more so; varying from pale dingy yellowish-grey and buff to yellow, the last sometimes deep in tint. Red patches sometimes intervene between paler portions; and small black spots, collections of dark concretions, are seen interspersed in follicles or in ducts.

(*c*) The redder portions just referred to are generally easily resolved by the naked eye into fine arborescent vascular injection; deeper in tint than that seen in the healthy organ.

Secondly.—Characters which are met with in some enlarged prostates, but not in all.

In some glands, the spheroidal prominences displayed on section are easily enucleated: they are then firm, pale, and destitute of much moisture. These are simple tumours, contained in the structure of the prostate; formations so commonly met with, and playing so important a part in connection with the pathology of the prostate, as to demand a separate consideration. (See Chapter VII. relating to Tumours.)

Other prominences are loose in texture, partially separable from the surrounding structure, but by no means to be enucleated. These have often quite as much of the yellow tint as the surrounding parts; and they have a moist succulent character. They are single gland-lobules, which seem to have become larger than the neighbouring gland-lobules; and they are much larger than those found in the normal prostate.

This condition is by no means uncommonly met with. It seems to indicate that a true hypertrophy may affect a portion of the organ, while adjacent portions are normal or but slightly affected. Thus one lateral lobe may be considerably enlarged, while the other is scarcely altered in size. When single lobules are affected in this manner, it suggests the existence of a condition intermediate between general hypertrophy and isolated tumour, and furnishing a link between them.

There is another very marked difference observable in examining enlarged prostates, which separates them into two somewhat distinct categories.

A typical example of the one kind exhibits, on section, an abundance of fluid exuding from the cut surface, and slight pressure greatly increases the quantity issuing. Similar fluid issues freely from the orifices of the prostatic ducts in the urethra.

A typical example of the other kind shows no fluid on section, neither on pressure is there any, or scarcely any, from the orifices just named. These conditions are easily explained by the varying amounts of active gland-tissue present in the two cases.

Again, in some instances small cavities are disclosed by section; these are sometimes empty, and sometimes give issue to a drop of thick yellow fluid, exactly like pus to the naked eye. These are by no means necessarily abscesses, and are not so unless some inflammatory action has been present, a condition studied under its appropriate heading. This yellow matter generally is, when not pus, the prostatic concretion in a more concrete state than natural, and containing the cell and allied elements, with a very small proportion of 'liquor' or fluid medium.

B. The structures of hypertrophied prostate, as examined by the microscope.

Regarding the elementary fibres of different kinds, of which the normal prostate has been shown to be composed (see Healthy Anatomy), we may commence by affirming that the enlarged prostate, when submitted to the closest microscopical scrutiny, presents no new, or other elementary, structure whatever than those there described. The existing normal structures are simply augmented in quantity. They may, however, although not necessarily, exist in different relative proportions to each other, or they may be arranged in a form differing from that which obtains in the normal state.

These structures are, as we have already seen,

(*a*) *Fibrous structures*; viz., pale muscular fibre, connective tissue, and elastic tissue; and—

(*b*) *Glandular structures*; viz., basement membrane forming recesses and excretory ducts; both lined with epithelium, polygonal and prismatic, and containing secreted matters.

The former (*a*) have been termed the basic or stromal part of the organ; the latter (*b*) the glandular part.

Structurally regarded, the prostate exhibits abnormal development in three or four varieties or types, shown in the tabular *résumé* below.

Such is the result of an examination of very numerous specimens, which, being necessarily destroyed by the process, were not included in the tables.

These varieties of enlargement, structurally considered, may be classified as follows:—

Prostatic enlargement of advancing years.	*A*. Over-development of tissues, glandular and stromal, mostly in normal proportions throughout. This may be regarded as 'true hypertrophy.'	A less common form of enlargement than others. The degree of enlargement less considerable than others.	On section, secretion abundant; concretions frequent.
	B. Increase of stromal tissue, but due chiefly to over-development of the white fibres, not of the unstriped muscular fibres. The original secreting structure may still exist, or may have diminished in quantity. This form may be regarded as a 'fibrous hyperplasia,' rather than as a general hypertrophy. If the pale muscular element is developed in like proportion, the term 'fibro-muscular hyperplasia' might be applied.	The most common form, and attains the most considerable size.	On section, the secretion appears according to the amount of gland tissue present; it is mostly smaller than in health.
	C. Excess of glandular tissue over stromal. This, on the same principle, may be classified as 'glandular hyperplasia.'	Rare.	Secretion abundant.
	D. Simple tumour-formations. These are to be regarded as chiefly local developments of hypertrophy; to be considered separately.	Very frequently met with.	

A. The first form, or that of true hypertrophy, is generally observed in those examples in which the size of the organ is not greatly enlarged, although abnormal increase may have continued during a long period of time. The natural relative proportions of different parts are not greatly disturbed; there is general fulness; increase of weight, to perhaps about double that of a healthy organ; and, generally speaking, there is no single portion of it which much predominates in size over the other portions. On section and by pressure a considerable amount of secretion may appear, at all events there does not appear to be any deficiency.

The form there described is not uncommon, but is by no means the ordinary type met with among patients. It may produce few symptoms, and may never affect the individual sufficiently to demand treatment of any kind. It may be fairly regarded as the best example of a typical hypertrophy.

Under microscopic examination, such a specimen shows few characters differing from those observed in the normal organ. There is some dilatation of the gland-follicles, a condition present in almost all examples of enlarged prostate that I have examined. Many of these are blocked up with yellowish semi-fluid contents, which appear to be the prostatic secretion in an inspissated form, and the well-known 'prostatic concretions.' This semi-fluid matter, although often resembling exactly pus to the naked eye, is resolved by the microscope into the following constituents:—a clear liquor, loaded with epithelium; both prismatic and ovoid or polygonal (the former from the ducts, the latter from the vesicles) globules of highly refracting matter resembling fat, but probably not so; much amorphous granular matter; and small amber-coloured semi-transparent concretions. These concretions are also found lodged in the ducts, and very often at or near their orifices in the urethra. The condition thus described may be regarded as true hypertrophy of the glandular structure.

B. Those forms of enlarged prostate in which the stromal constituents are developed in large excess as compared with the glandular structure.

There is no doubt whatever that this is by far the most common form in which enlargement is presented. It has been said to be the invariable condition which constitutes enlargement of the prostate; this, however, as already seen, is certainly not the case. Among those examples which attain the greatest bulk, such as organs weighing from two ounces upwards, this form of enlargement is almost the only one met with; that depending upon a considerable formation of tumours being sometimes excepted.

Under the microscope will be found, in well-marked specimens of the class now under consideration, large portions of stromal structure, unaccompanied or not penetrated by any glandular structure. Portions of the greyish material which pervades the mass may be unravelled under water on the glass slide, and no gland-structures be found in it: in other portions these latter are found in very small quantity. The larger portions of stromal tissue, unmixed with glandular, are situated usually near the periphery of the organ, in the lateral lobes, lying beyond the glandular lobules, and forming sometimes a thick stratum between them and the capsule.

It is hardly necessary to observe that this form is to be distinguished from that enlargement which results from inflammatory action, and which is considered by itself in the Third Chapter. That action occasions a deposit of its own proper products; but there is no reason to believe that it has any power to generate any of the natural structures of the prostate. The new product consists of normal constituent tissues of the body itself, while the lymph of inflammation is the result of a morbid effusion, and as such becomes in course of time in part removed by the unassisted efforts of nature.[1]

Respecting some of the examples of this class it may be said, especially of those which have attained the largest size, 'the stroma' of the gland is not identical with that of the normal organ. The white fibres, that is the fibres of connective tissue, are notably in excess over the other constituents, the unstriped muscular fibres being usually found in small proportion. There may be some cases, but if so they are rare, in which the muscular fibre is increased, so as to maintain its normal proportion to the white fibre. I should propose to call such cases examples of 'fibro-muscular hyperplasia,' rather than of general hypertrophy; while instances of large excess of the latter, or white fibres, might be characterised as examples of 'fibrous hyperplasia.' It is due probably to the prevalence of these latter that the group of enlargements of the prostate hitherto so widely regarded as illustrating one condition popularly known as hypertrophy of the prostate, has lately been affirmed by Professor Guyon, of Paris, to be uniformly identical with the change known in other organs as sclerosis. In regard of this view I must express a belief that, in the sense in which that term has been employed by pathologists in this country, prostatic hypertrophy cannot be so considered. A typical example of sclerosis, according to our usage of the term, is that change in the spinal cord in which nerve-tissue is replaced by a gradual formation of white fibrous tissue with a tendency to subsequent contraction. Perhaps a deposit which affects the structure of the liver in a similar manner, and produces contraction of the lobules (cirrhosis), may be cited as another example of sclerosis. In neither case is there any increase in bulk of the organ affected, but the reverse. Notwithstanding, Professor Guyon appears to consider all forms of the ordinary enlarged prostate of advancing years to be produced by the process of degeneration, as he says, often associated at that period of life with atheroma of the vessels, &c., and resulting in sclerosis of the organ.[1]

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[1] Dr. C. Handfield Jones appears to have been the first to point out the fact that senile hypertrophy was frequently due to increase of the fibrous element rather than of the glandular.—*Medical Gazette*, August 20, 1847.

I cannot altogether assent to this view, emanating as it does from a source entitling it to the highest respect; I find it difficult to admit that the steady increase in size of the enlarged prostate, proceeding as it does with ceaseless activity in the production of new tissue, is necessarily associated with impaired vascular supply, or is by any means a process of degeneration in pre-existing structures. In fact, the hypertrophied prostate is very far from being invariably the local expression of a general depravation of nutrition affecting the constitution, or of a diminution of vitality. I have seen numerous examples in persons whose condition of body was remarkably healthy for their age, although they have been compelled, for ten or fifteen years perhaps, to remove all their urine by catheter on account of large obstructing prostate. No doubt such patients are exceptions to the general rule, but they prove that the disease is by no means necessarily associated with a feeble or decaying constitution.

The single, uniformly present, and most obvious character of the change, is a considerable formation of new tissues throughout the organ, whether glandular or stromal, whether in its complete form, or manifested in regard of one element only, or, on the other hand, as local hypertrophy affecting one portion only, as outgrowth or tumour, and not another. To designate a certain number of examples of enlargement, no other word than hypertrophy can be applied; while for others, I have ventured above to indicate the use of a second term, namely, 'fibrous hyperplasia,' as being perhaps more accurate in relation to the present state of our knowledge. Lastly, the action of sclerosis, as hitherto understood, tends ultimately to contract the bulk of the organ affected. No such tendency is ever observed at any stage of the development of enlarging prostate, which almost uniformly continues to increase so long as the subject of it lives; at all events, at no period of its course is any contraction and diminution in size observed to take place.

It is not uncommon to find in the larger specimens of either class cavities measuring one or two lines in diameter, lined with smooth membrane, often empty, sometimes containing several concretions. Abundance of these latter are commonly met with in and among the glandular parts of the organ, where also may be found some collections of the yellowish semi-fluid matter described above.

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[1] *Annales des Malad. des Org. Gen.-Urin. Leçon Clinique*, No. 4, March, 1885. Paris.

C. Excess of development in the glandular structures over the stromal: glandular hyperplasia.

This condition is exceedingly rare. I have examined certainly one, if not two, such specimens, and record them here in consequence. The gland, in the first instance, weighed about 14 drachms, and enlargement appeared to affect each part in a pretty equal degree. When cut, much fluid exuded, the structure was extremely succulent, and the yellowish glandular parts obviously predominated over the greyish stromal part.

Under the microscope, gland-structure was seen to abound throughout the organ, and gland-products pervaded almost every part. The gland-follicles were a little enlarged, that is, to about double their average size; besides these, several cavities, containing the yellow semi-fluid matter, were present. There can be no doubt that in this case the glandular structures existed in a much larger proportion to the stroma than that which is met with in the normal prostate. A second specimen was examined, the condition of which resembled the preceding, but it was not quite so well marked.

D. Rearrangement of the normal structures of the prostate, fibrous and glandular, in the form of tumours.

Here the elementary constituent tissues of the organ do not exhibit the primordial arrangement, as in the forms of enlargement already described. The new structure is disposed in rounded masses, often isolated from the adjacent prostatic structure, by which, nevertheless, they are surrounded. These tumours, so frequently associated with hypertrophy of the prostate, are peculiar in character; their full consideration, therefore, will be deferred to the succeeding chapter.

CHAPTER VII.

TUMOURS AND OUTGROWTHS OF THE PROSTATE.

SIMPLE TUMOURS—Frequency of their occurrence—Described by several Anatomists—Examples cited—Their Physical Characters and Intimate Structure—OUTGROWTHS—Nature of—Relation between them and Tumours of the Uterus—Rare Form of Polypus of the Prostate.

Simple Tumours and Outgrowths from the Prostate.—In considering the external characters and the intimate structures of the hypertrophied prostate, it has been necessary to allude to, and partly to describe, certain tumours often embedded in the organ, as well as the outgrowths, usually connected with the median portion.

It may be premised that these formations are always of slow growth, and generally of moderate size; they have no malignant character, and are thus distinct from the cancerous formations to be hereafter considered as occasionally affecting the prostate. They are found almost always in the hypertrophied organ, but are, nevertheless, occasionally met with in that of normal size. Their presence is more common, I believe, than is generally supposed; indeed it cannot be doubted that they are present in a large majority of the cases of hypertrophied prostate.

Thus, in three-fourths of the hypertrophied specimens in my own series tumours were present, as well as in two or three which were not hypertrophied; of the latter, No. 181 is an example; here they are extremely minute, although quite distinct. Dr. Messer reports the occurrence of isolated tumours in no less than 27 out of 85 hypertrophied prostates.

Of 70 specimens of hypertrophied prostate in the Museum of the Royal College of Surgeons, in 17 the isolated tumours may be seen in the preparations as they stand in the containing vessels. No doubt others would be found by a more intimate examination. In a large proportion of the remainder there is an outgrowth, more or less pyriform in shape, projecting from the median portion.

It is manifest, from the examination of morbid specimens, that there are two forms of new growth associated with the prostate affected with hypertrophy.

A. Tumours which are generally embedded in the substance of the prostate, but the structures of which are isolated from those which surround it.

B. Outgrowths which are continuous in structure with the parts of the prostate whence they spring, but which manifest a tendency to become partially isolated, by assuming a more or less polypoid form and maintaining attachment to the parent organ through the medium of a pedicle only.

Both these conditions differ materially from that already considered as simple hypertrophy affecting the organ either generally or partially. The class of outgrowths appears to offer examples of a morbid formation midway between isolated tumour and general hypertrophy.

We will study, first,

A. The isolated tumours of the prostate.

The fact of their occasional appearance has long been recognised. Sir E. Home describes and very clearly depicts them in his work.[1] He believed them to be the remains of extravasated blood-clots in the substance of the gland, and he conceived that they were produced by the rupture of vessels, and generally occasioned by violent exercise, especially by hard riding.

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[1] *Practical Observations on the Treatment of Diseases of the Prostate Gland*, vol. ii. London, 1818. *Vide* pp. 17, 21–25, 273, 277, 285; plates i. ii. iii. iv. v. vi. and vii.

Within the last few years the nature of these tumours, and their relation to the prostate, has been the subject of more extended inquiry.

Cruveilhier carefully examined them, and suggested a view which some later writers have more completely developed. The original is as follows. It relates to an enlarged prostate taken from a patient who had died in the hospital, and been examined afterwards.

'The tissue of the gland was very easily torn, and in so doing, portions of an irregular spheroidal form were separated; the largest of these had about a magnitude of a middle-sized nut. A section of the gland exhibited surfaces of circular outline, of which each belonged to one of the spheroids.

'Each of these spheroids was evidently a glandular vesicle or lobule hypertrophied. The tissue of each lobule presented a cellular texture' (to the naked eye understood); 'the cells, of unequal magnitude, were filled with the prostatic liquor. Several of the larger (glandular) vesicles were converted into cells (or crypts), and contained a matter, yellowish and thick, like purulent matter.

'These large vesicles or lobules, although perfectly independent or isolated, were held together by a framework or bed of intervening tissue, evidently muscular in its character, and which I can compare to nothing so well as to the tissue of the gravid uterus. The prostatic envelope, very easy to isolate from the muscular fibres of the bladder, was constituted by a rather thick and whitish muscular layer. . . . Thus we see that the prostate was made up of large vesicles or lobules scattered throughout a bed of muscular tissue, which furnished a thick envelope for them. Each glandular lobule was cellular in its character.'[1]

Velpeau called special attention to these tumours of the prostate; and although he appears not to have minutely examined their histological resemblances to other tumours, he pointed out what he believed to be an analogy between them and the fibrous tumours of the uterus.

He says, speaking, in his lectures, of certain cases of death which had occurred, in his *clinique*, from enlargement of the prostate and its consequences:—'When these patients die, they always present tumours in the prostate. Let us dwell for an instant on this subject, since it merits particular attention. I have attempted to show the relations which these tumours, affecting certain individuals, hold to those fibrous bodies or tumours which are developed in the uterus. You know that the fibrous tumours of that organ develop themselves sometimes very near the uterine mucous membrane, from which they soon project; that they often become engaged in the uterine neck, and from thence protrude into the vagina, where they constitute what is commonly called "fibrous polypus" of the uterus: that at other times they are situated very near the serous covering of the uterus, become prominent into the abdominal cavity, and give rise to so-called peritoneal fibrous tumours. If, on the contrary, they are developed in the substance of the uterine walls, and remain so, they form there the "fibrous tumours" properly so called, which sometimes present masses of extraordinary size and weight.

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[1] *Anatomie Pathologique*, Livraison xvii., descriptive letterpress belonging to plate ii., p. 3. Paris, 1833-4.

'I perceive a great analogy between these prostatic tumours and the "fibrous tumours" of the uterus.

'1. There are some of these fibrous prostatic tumours, which are developed in the direction of the vesical cavity, which become absolutely pedunculated precisely as do the fibrous polypi of the uterus, and become enveloped by the vesical mucous membrane. These, with a peduncle more or less extended, may acquire the volume of a nut, or even of half of an egg.

'2. These fibrous tumours may be developed in the very substance of the prostate, and may acquire a volume similar to that of the preceding.

'3. Finally, they may be developed at the perineal or at the rectal surface of the prostate, and may project towards the perineum, towards the side of the pelvis, or into the rectum.

'Observe, then, a great analogy in the matter of situation. But there is a great analogy in the matter of structure also. These are veritable "fibrous tumours," and not mere "hypertrophy of the prostate," as has been said. I do not regard these tumours as degenerations of the organ, but rather as new productions. It is not surprising that this (hypertrophy) should be the common idea respecting the prostatic tumours, since for a long time it has been customary to believe that the "fibrous tumours of the uterus" were nothing else than hypertrophy of the normal tissue of the womb.'[1]

Rokitansky originally took these tumours to be simple fibrous formations analagous to the 'fibrous tumours,' loosely so called, appearing in other parts of the body. Subsequently, when studying the subject of bronchocele, and examining the isolated masses embedded in, and situated near to, the hypertrophied thyroid gland, which were evidently masses of gland-tissue like that of the parent gland, he remarked a similarity of relationship between the prostate gland and its tumours, that is to say, those now under consideration. He found, on examination, that these formations were composed of basic structures, identical with those forming the prostate itself, but that the glandular elements were less perfectly formed, less completely developed, as a rule, than those of the normal and healthy gland.

He observed also, that the rounded masses were not always confined within the limits of the prostate gland itself, but that they were elements, and that these are by no means common. That, generally, there are present, in addition to the fibrous structures, some gland-elements more or less imperfectly developed.

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[1] *Leçons orales de Clinique Chirurgicale*, par M. le Prof. Velpeau, tome 3me, pp. 478-9. Paris, 1841.

FIG. 15.

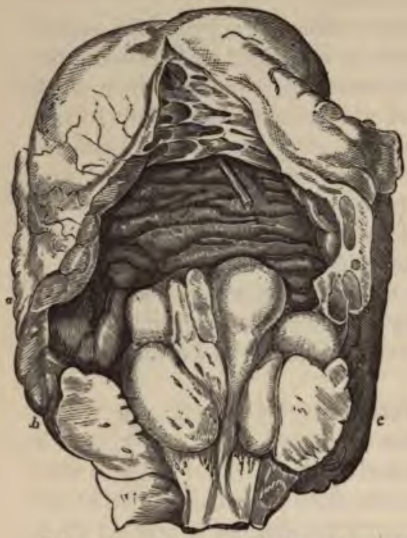
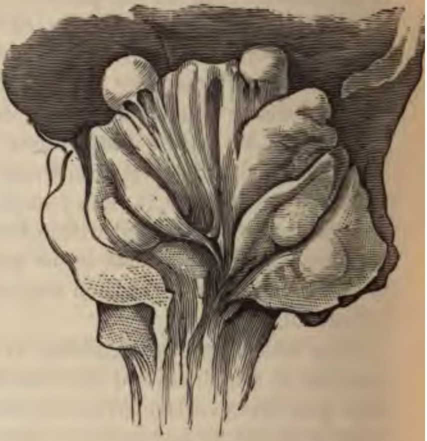


FIG. 16.



Enlargement of prostate from fibrous tumours; bladder diseased and sacculated; showing section through anterior part of bladder and prostate. The enlargement of the prostate is seen obstructing the vesical neck, and projecting into the cavity of the bladder. A rounded eminence occupied by one of the tumours is dissected out in fig. 16.

Two of the above small tumours partially dissected out; two divided by section of each in the middle cut surfaces bulging.

Among specimens sent to the College of Surgeons, with the essay on the prostate, to which the Jacksonian prize was awarded in 1857, I submitted some to section and to microscopical examination. The latter showed the basic structure to be identical with that of the healthy prostate, viz., bundles of pale muscular fibre, with connective tissue, and a little elastic tissue; very little glandular structure seen; a few depressions or pouches, and some ovoid epithelium (same as gland-epithelium in the normal prostate), and a few prismatic epithelial cells (same as exist in the ducts of the prostate). To sum up all that is known on the subject of the tumours in question:—

In a considerable number of hypertrophied prostates rounded tumours are found, which are more or less isolated from the surrounding tissues of the gland. These tumours do not appear to affect any particular part of the prostate more than another, and may be found in any part of it. Perhaps they are more numerous in the lateral lobes, especially at their posterior extremities, than elsewhere. Occasionally they are embedded in an enlarged median portion. It often happens that the small multiple eminences so frequently seen at the neck of the bladder, in the site of the uvula, are due to these small tumours there situated, under the mucous membrane and a few submucous fibres, there being no enlargement of the median portion. When the swelling is large and single, it is more commonly hypertrophy or outgrowth of the part. Rarely they are found in the anterior commissure of the prostate. Sometimes they appear just under the capsule, and so spring from the surface, carrying, in an outward direction, the capsule as a covering, but nevertheless escaping altogether the contour of the gland, and looking almost like an independent or outlying formation. Occasionally they are really outlying, *i.e.* separated by an interval from the prostate itself. A space of half an inch has been seen to intervene between such a tumour and the adjacent gland; a narrow line of duct, with other vessels, and a little tissue alone connecting them.

When embedded in the substance of the prostate, as most commonly happens, they occasionally appear to be almost unconnected by continuity of tissue with the adjacent structures, and they may be easily enucleated. Most commonly some fibres exist, uniting them to these, and in a few instances the uniting tissue is considerable in quantity.

The size of the embedded tumours ranges between a tenth of an inch and about five-eighths of an inch in diameter. Their density is rather greater than that of the prostatic tissue proper; they are firmer to the touch, and more compact. If divided while retained in their original position, as when a section made through a prostate gland passes through one of the tumours, its cut surfaces protrude above the plane of the surrounding surface, and present a slight convexity. They are for the most part paler in tint than the prostatic structure proper. Commonly a thin layer of the tissue which immediately environs them is a little compressed, so that in some cases the tumour appears to lie in a kind of cyst, which is occasionally very well marked. When not isolated, but outlying in situation, the tumour may attain a larger size; as in the example referred to, page 74. Their vascularity is evidently less than that of the surrounding prostatic structure.

Examined by the naked eye, or under the microscope with powers of different degrees, we can discover no structural peculiarities as compared with the prostate itself; they possess all the elementary tissues common to the normal prostate, and they possess no tissue not belonging to it.

Respecting the arrangement of these tissues, the basis of the tumours appears to be the fibrous basis or stroma of the prostate itself, a structure already described. Interspersed with this, there are present in most cases small cavities containing flattened polygonal or spheroidal epithelium, like that seen in a pouch at the extremity of a prostatic gland-duct, and sometimes, also, some prismatic epithelium. These cavities are sometimes solitary, sometimes slightly branched, and sometimes of an elongated or tubular form. In a few instances there is very little, or, perhaps, no such glandular tissue to be found; generally, however, a careful search will discover it. In some of the outlying tumours the glandular structure is more perfectly developed—in some it is quite so—and a duct is furnished which evidently carries secretion to the appointed destination.

With such a mode of formation, all that is known respecting their slow mode of development, and their indisposition to manifest any morbid or other changes whatever, except that of simple increase in size, it is quite certain that they possess none of the characters of malignant growths, but are simple or benign in their tendencies.

There can be no doubt that the embedded tumours occur both in the hypertrophied and non-hypertrophied prostate, though much more commonly in connection with the former condition. There appears to be no ground whatever for the theory that an hypertrophied condition of the prostate is altogether dependent on tumour-formation. There may be, as already shown, simple hypertrophy of the prostatic tissues without any tumour-formation at all. But there is, at the same time, no doubt that their presence is more common than their absence in the hypertrophied prostates of elderly people.

It may be that there is a tendency to the production of these tumours in the prostates of all, or nearly all, elderly subjects; and that when the disposition to hypertrophy exists also, the tumours participate in the disposition equally with the rest of the tissues, and thus become objects of attention to the pathologist.

B. Outgrowths continuous in structure with the parts of the prostate whence they spring, but which manifest a tendency to become partially isolated, by assuming a more or less polypoid form, and maintaining attachment to the parent organ through the medium of a pedicle only.

It has been already seen that any one portion of the prostate may exhibit undue development, while surrounding parts are either but slightly or not at all affected by any such action. The outgrowth from the median portion is the most familiarly known example of this. It assumes a pyriform shape even in its earliest stage, and is always continuous in structure with the adjacent prostatic tissues from which it springs. It has its own special ducts, which traverse the pedicle to open in the urethra, and in its substance may be almost invariably detected those concretions which are found in the adult prostate. It may vary in size from that of a pea to that of a middle-sized pear, and at the outset exerts a perceptible influence on the neck of the bladder, the lower or posterior border of which is gradually elevated as it increases. Ultimately it finds its way into the cavity of the viscus, where it sometimes becomes polypoid in shape.

Occasionally this pyriform mass is connected to the main body by so long and slender a pedicle, that it appears at first sight to be a separate or outlying portion. Such was the condition in a case I recently examined.

The glandular structure of these outgrowths is generally, as might be expected, more perfectly developed than in the isolated tumours. Concretions, as just stated, are commonly found in various stages of progress embedded in the former, but I never found this to be the case in any of the latter; and the reason appears obvious. In the one case there is an actually secreting structure with ducts of exit in a state of activity; in the other the structure is rather an imitation, or imperfect development, of a secreting apparatus, and consequently it cannot be supposed that any functional office is performed by it.

The occurrence of outgrowth, although most common in the part described, is not invariably confined to it. A projecting growth may occasionally spring from the posterior part of either lateral lobe, and has been even observed to arise from that part of the prostate which lies above or anterior to the internal meatus of the urethra.

It must not be overlooked that hypertrophy of some of the tissues of the prostate may, and commonly does, coexist with tumour or outgrowth—almost invariably with the latter. And, doubtless, the outgrowth is only a more marked expression of the same disposition which pervades the organ, in some measure, perhaps determined by the form and nature of the cavity towards which the protrusion is directed; the existence of the cavity of the bladder probably permitting a development which would not be possible in other directions, where masses of solid structure oppose such extension.

A consideration of the facts exhibited under the subject of tumours and outgrowths serves as an appropriate introduction to the suggestion long ago made by Velpeau, that some analogies of a remarkable kind exist between the characters and relations of these two forms of tumour and those which affect the uterus. He rested the analogy upon a belief that the uterus and the prostate originated from the same centres of development in the early condition of the ovum, coupled with the fact that both are liable, in after life, to exhibit tumours presenting similar external characters.

The observations of modern anatomists confirm the view that the analogue of the uterus, or rather of the uterus and vagina combined, is in the male the prostatic vesicle or utricle. This is the view taken by Leuckart, in the 'Cyclopædia of Anatomy and Physiology.' It was maintained by Sir James Simpson in an exhaustive 'Memoir on Hermaphroditism and Sexual Malformations generally,' from which an extract is appended in a note below.[1] The prostate, then, although so long and slender a pedicle, that it appears at first sight to be a separate or outlying portion. Such was the condition in a case I recently examined.

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There is another fact of some importance, viz., that the prostate and uterus are organs whose bulk is constituted by the same tissue, namely the organic muscular fibre. No other organ is similarly constructed by thick masses of this structure; elsewhere it is distributed in membranous layers. This identity of structure is, perhaps, as closely related to the pathological question before us as that of identity of origin in early fœtal life, since it has probably some influence in determining the appearance of tumours and outgrowths of similar character in each of the two organs.

In the uterus these formations are nearly or completely isolated, and are composed of organic muscular fibres, with connective tissue, embedded in the substance of the organ, or standing out in relief from either surface. In the prostate are similar tumours, and they are similarly disposed. Although, on the authority of Rokitansky before referred to, an analogy has been pointed out as existing between these embedded tumours of the prostate and those of the mammary gland, the grounds of that analogy appear less complete than those which indicate their relation to the fibrous tumours of the uterus as just suggested. The prostate differs very materially from the mamma (and, in a corresponding degree, resembles the uterus) in being mainly constituted by unstriped muscular fibre, while the mamma is simply a

Thomson, have at all doubted that this organ is a representative or analogue, in the male organisation, of the genital canals of the female.* But different opinions have been expressed as to whether it morphologically represents the vagina, or the uterus, or both. H. Meckel at one time, and in opposition to almost all other authorities, suggested and maintained that it was the analogue of the vagina, rather than of the uterus. Weber considered it as the male prototype of the female uterus; and still more lately Bimbaum and Leuckart have shown that this organ may be more truly held as the morphological equivalent of the whole sinus genitalis, both the uterus and the vagina—an opinion now generally shared in by those who formerly took a different view of the subject. Huschke has sometimes found the lower or vaginal portion of the male utriculus separated from the upper and dilated end by a constricted point, as if indicating its division normally into uterus and vagina. Indeed, it is only in accordance with this last doctrine that we can understand the relative positions and modes of junction of the genital and urinary canals in some monstrosities, and the fact of the great variety of forms and shapes which the male uterus or prostatic vesicle assumes when it is found—as so often happens—preternaturally enlarged and disproportionately developed in different kinds of hypospadiac and hermaphroditic malformation.'

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* 'Some of the various diseased states attributed to enlargement, &c., of the third lobe of the prostate gland will be yet found, I believe, to be morbid states of this prostatic vesicle. To the minds of some "The Investigation of the Diseases of the Male Uterus" would appear to be almost a paradox in thought and words.'—*Obstetric Memoirs and Contributions*, edited by Drs. Priestley, of London, and Storer, of Boston, vol. ii. pp. 318, 319. London, 1856.

secreting organ, or gland. The prostate is primarily an aggregation of organic muscular fibres constituting, or surrounding, the neck of the bladder: this mass being permeated by glandular tubes and follicles. Were the small glandular tubes found in the inner wall of the uterus prolonged more deeply into its substance than they are, the analogy between the structure of the uterus and that of the prostate would be more complete.

There would almost seem to be an inherent natural tendency in the unstriped fibre to produce independent centres of growth in organs formed by it, the type of these formations being the so-called fibrous tumours of the uterus. In the prostate also the same development takes place, only associated with certain imperfectly formed gland-tissues; but the addition may be fairly regarded as an accident, depending on the presence of glandular elements in the muscular organ in its normal state. Hence the amount of gland-tissue so intermixed with the tumour is variable in different specimens.

The uterus also presents a polypoid form of tumour, which, springing from the interior, is more intimately connected with the uterine structure than the variety just described, perfect continuity of tissue existing between it and the polypus. In like manner the median portion of the prostate often presents an outgrowth, tending to become polypoid in form, and exhibiting complete continuity of structure with the prostate itself.

It may be further observed that all these outgrowths and tumours, may remain of so small a size, both in the uterus and in the prostate, that the bulk of the organ is not sensibly increased, and no signs of their existence during life are produced; while on the other hand they may increase to an enormous extent, so as to exceed by many times the natural size and weight of the organ in which they originated, and give rise to important derangements of function.

The two organs are alike subject to considerable hypertrophic enlargement, mainly consisting of their constituent fibrous elements. And in both, this condition may be associated with some tumour-formation, or it may exist independently of it. In the latter case, the hypertrophy may be general or local, affecting the whole or certain parts of the organ; and, when thus local, affecting particular spots more commonly than others.

The two organs are liable to these changes after the prime of life has passed. Bayle, whose observation is quoted by Rokitansky, and verified by Dr. Robert Lee, says that 20 per cent. of women, after 35 years of age, have fibrous tumours of some size in the uterus.[1] I have found prostatic tumours in 30 per cent. of males after 50. In women, however, the tendency to this formation declines after 50, although it cannot be said to cease. Nevertheless it is exceptional after that period. It is generally regarded as most active during the term of uterine functional activity, or rather during the latter moiety of the time. The age at which the reproductive function of man is most vigorous is certainly not that at which a like tendency in the prostate is evinced; but on the other hand, it may not be forgotten that the term of productiveness is not limited in the case of the male, as in the opposite sex.

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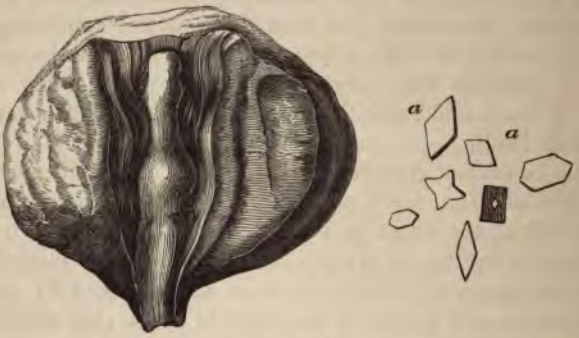
[1] Rokitansky makes the age still later. Fibroid tumours of the uterus, he says, 'are unusual up to the thirtieth year, and present themselves most frequently shortly after the fortieth year.'—*Manual of Patholog. Anat.*, Sydenham Soc., vol. ii. p. 298.

There is another form of outgrowth from the prostate, the occurrence of which is extremely rare, to be mentioned before closing the chapter. It has no relation to any of the preceding varieties. It is a polypus springing from the verumontanum. I know of four examples only. The first is in the museum of St. Thomas's Hospital, No. BB. 8, a small polypus about half an inch long, and two lines in breadth, springing from the verumontanum in a child, and directed backwards towards the neck of the bladder. The second is mentioned by Rokitansky, but not described, as a solitary case which he had seen.[1]

FIG. 17.



The third occurred in my own practice, and was exhibited by me at the Pathological Society of London in 1856.[2]

It was about five-eighths of an inch in length, soft in consistence, and at its base was continuous with the apex of the verumontanum, lying in the urethra, which it appeared to fill, and reaching to the neck of the bladder. It was composed of the elements of fibro-cellular tissue, with a few organic muscular fibres intermingling at its base. In some parts were seen, near the centre of the growth, some minute crystal-like bodies, having very much the appearance of uric acid, yellowish in tint, and rhombical in form, with a few octahedra.

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[1] *Path. Anat.*, Syd. Soc., vol. ii. p. 235.

[2] *Trans. Path. Soc.* vol. vii. p. 250, with engraving.

They proved to be crystals of some earthy carbonate (see fig. 17, *a a*). The tumour was covered with mucous membrane and columnar and spheroidal epithelium. The patient's age was fifty-four.

The only point in the history which related to the presence of the polypus was, that the man had for some time been in the habit of passing water with greater frequency than usual. I recently met with another example resembling the preceding, but more vascular in structure; in a man who died of renal disease at forty-eight.

CHAPTER VIII.

THE CAUSES OF THE ENLARGED PROSTATE OF ELDERLY MEN.

The Subject of Causes obscure—Its Investigation extremely important—Most circumstances alleged to be Causes cannot be so regarded—Present Views stated—Inflammation not a Cause—nor Stricture nor Calculus—nor Venous Stasis—Gout, Rheumatism, and Syphilis not Causes—Sexual Excess—Prostatic Enlargement not analogous to Glandular Hypertrophy, nor to Hypertrophy of other Muscular Organs depending on Increased Function—Enlargement of Prostate and Uterine Tumour may be related—Perhaps a necessity of their Common Structure—Ascertainable conditions under which Enlargement occurs—Analysis of Results arrived at in relation to Age.

NEXT in importance to the discovery of the means of cure for the enlarged prostate of elderly men, would be a knowledge of the causes, remote and proximate, of the affection. While many authors acknowledge that much obscurity attaches to this subject, others confidently regard several agents in the light of causes; while most appear to agree that at least some of these agents are so. It appears, however, that in order to accept the current etiological views of this affection a good deal must be taken for granted; and that an examination of evidence concerning them must lead us to reject nearly all. Were the numerous theories respecting causation to be cited here, which have been proposed from an early period to the present time—and they are still occasionally referred to as valid—this chapter would be unduly prolix.

It is desirable, however, to put on record a brief sketch of the views held by some of the most distinguished observers of past time, and this will be done by way of quotation, before making an attempt to examine the subject for ourselves.

John Hunter says nothing directly in relation to causes, but states that he has seen antiscrophulous remedies serviceable in several cases.[1] It should be remarked, however, that the distinction between the enlargement of the prostate occurring in youth, rarely tuberculous, and mostly consequent upon gonorrhœal inflammation, and prostatic hypertrophy, was not then made. In the chapter quoted, these two widely differing conditions are spoken of indifferently: yet, on the authority of this passage, such remedies have been administered in the last-named complaint.

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[1] *A Treatise on the Venereal Disease*, 2nd edit., p. 174. London, 1788.

Sir E. Home, who enjoyed large opportunities for the observation of these cases, was of opinion that the chief predisposing cause consisted in 'the slow return of the blood from the neck of the bladder, arising from the disadvantageous situation of the veins respecting the heart,' including habitual congestion of those vessels ; and that this was rendered more powerful by the undue indulgence in the pleasures of the table, or in any habits which 'increased the circulation of the blood in those parts.' The most common and influential proximate cause he considered to be the effects of horse exercise, producing 'rupture of vessels in the internal parts of glands,' establishing thus 'a great analogy between this complaint and apoplexy.'[1] At the same time he believed prostatic enlargement to be one of the changes natural to old age.

Mr. Wilson, in his lectures at the College of Surgeons, in 1821, having stated that he has 'met with several cases which confirm the justness of the observation' of Sir E. Home, respecting the liability of individuals of full habit to the disease, observes, 'that it appears to occur most frequently in those persons who, either from living a life of strict celibacy, have not used the genital organs so much as nature seems to have intended, or who have injured both the genital and the urinary organs by a life of excess.' Finally, he adds that 'many persons have suffered much from the enlargement of the prostate gland who have lived a moderate and quiet life, without approaching to either of the above-mentioned extremes.'[2]

Sir Charles Bell gives no opinion as to the remote or predisposing causes, but believed that a predisposition to prostatic enlargement existing, one of the most frequent and important exciting conditions would be found in any source of irritation to the bladder, inducing repeated contractions of the organ. Whatever the occasion of these, which was indifferent as regards the ultimate result, the 'muscles of the urethra' were set in constant action, the effect of which, according to his view, was to draw backwards the middle lobe or median portion, to which he stated them to be attached, and thus to produce the elevation so frequently observed to form an obstruction to the emission of urine by the vesical neck.[3]

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[1] *Practical Observations on the Treatment of the Diseases of the Prostate Gland*, vol. ii. pp. 9, 10. London, 1818.

[2] *Lectures on the Structure and Physiology of the Male Urinary and Genital Organs*, pp. 331, 332. London, 1821.

[3] *Medico-Chirurgical Transactions*, vol. iii. 1812, pp. 171–189. Illustrated by three plates, showing dissections of these muscles.

Sir A. Cooper says, 'The enlarged prostate is the consequence of age, and not of disease.'[1]

Sir Benjamin Brodie regards enlarged prostate as an almost invariable accompaniment of advanced age, assigning it a place in that category of phenomena which marks the decline of life. Thus he says, 'When the hair becomes grey and scanty, when specks of earthy matter begin to be deposited in the tunics of the arteries, and when a white zone is formed at the margin of the cornea, at this same period the prostate gland usually—I might, perhaps, say invariably—becomes increased in size.' Hence no other circumstances or conditions than the general one of declining life are mentioned by him in the light of causes.'[2]

Mr. Samuel Cooper, in his Dictionary, after reviewing various statements, sums up with the following opinion:—'It seems to me better to confess that the etiology of this complaint is unknown . . . ;' but he adds, 'I have known several persons afflicted who had led very sedentary lives.'[3]

Mr. Coulson states, on the authority of others, the usually recognised causes, but expresses no decided opinion in favour of any one of them.'[4]

Dr. Gross, of Louisville, doubts the influence of some of the agencies usually assigned as causes of hypertrophy of the prostate, but thinks there is no doubt that it may be induced by the following:—'Habitual engorgement, protracted and frequently repeated sexual intercourse, irritation resulting from the presence of a vesical calculus. Finally,' he says, 'the protracted or frequent use of stimulating diuretics, of wine and alcoholic drinks, exposure to cold, the repulsion of cutaneous diseases, gout and rheumatism, external violence, the frequent introduction of the catheter, and habitual straining at stool, as in chronic diarrhœa and other affections of the bowels, may all be enumerated as so many exciting or predisposing causes of this affection.'[5]

Desault speaks of enlarged prostate as being 'very common in elderly people, and in those who have had many attacks of gonorrhœa; nevertheless, it is not always a result of venereal taint.' He believed that it might 'sometimes arise in the scrofulous and other cachectic habits.'[6]

Amussat adopts the older views, which had long been current among continental surgeons; and these his opinion may be regarded as well and briefly expressing. 'Syphilis, the presence of a foreign body in the bladder, the existence of strictures in the urethra, are its most ordinary causes. It is observed especially in elderly persons who have long used sounds or bougies, which they introduce themselves. In this case, the swelling of the prostate is occasioned by chronic inflammation produced by the contact of instruments.'[1]

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[1] Lectures in *Lancet*, vol. iii. 1824, p. 239.

[2] *Lectures on the Urinary Organs*, 4th edit., pp. 163-166, and 186, 187.

[3] 7th edition, p. 1122.

[4] *Diseases of the Bladder and Prostate Gland*, 5th ed., p. 589.

[5] *A Practical Treatise on the Diseases, &c., of the Urinary Bladder*, 2nd edit., pp. 688-691. By S. D. Gross, M.D. Philadel., 1855.

[6] *Œuvres Chirurg. de P. J. Desault*, édit. 3me, t. iii. p. 238. Paris, 1813.

Civiale devotes a section to the special consideration of causes, in which he declines to consider speculative questions relating to the supposed analogy between the prostate and the uterus, or the resemblance which has been suggested to exist between its enlargement and that of the thyroid gland or liver, &c.; and enumerates those which he believes to be proximate or exciting causes; placing first in order of influence the presence of calculus in the bladder. Next come organic strictures of the urethra and the difficult micturition which results. Much stress is laid upon this, and Cruveilhier's remark that stricture and prostatic enlargement rarely coincide, is quoted for the purpose of refuting it; Civiale stating that numerous facts exist attesting the accuracy of his view of the question. On the other hand, he admits that the influence is not constant, since urine, arrested by the stricture, may hinder, by means of the pressure reflected backwards, the prostate from becoming enlarged. The improper use of instruments in the urethra is placed next on the list. He combats the notion that venereal excesses have any intimate relation with the prostatic affection; and believes that authors have been far too ready to admit their influence without examining the question.[2]

Mercier, who discusses the subject at length, regards as predisposing circumstances 'all those which most favour stagnation of the blood. Persons of soft and lymphatic habit, with the cellular and adipose systems largely developed, possess generally very lax and unresisting venous tissues; and observation shows that such are most frequently the subjects of prostatic engorgement.' . . . 'I believe there is a certain relation between weakness of the inferior veins and hypertrophy of the prostate; this explains why the affection appears sometimes to be hereditary.' He considers sedentary habits to favour greatly prostatic enlargement, stating that shoemakers have formed one-third of his cases in hospital practice; after these come house-porters, weavers, and tailors. He adds that it is no less true that active men are also victims to it, and questions whether a vertical position of the body, much prolonged, may not produce the same effects as a sitting one. Finally, admitting the effect of blood stasis, he inquires, 'does this act by rendering nutrition more active, since a limb which is much exercised acquires great development, or does it rather retard the process of decomposition, rendering less easy the separation of elements which otherwise would be eliminated?' He confesses his inability to answer this question.[1]

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[1] *Leçons sur les Rétentions d'Urine*, pp. 199, 200. Par Dr. Amussat. Paris, 1832.

[2] *Traité pratique sur les Maladies des Organes Génito-Urinaires*, par le Dr. Civiale, édit. 3me, pp. 244 *et seq.* Paris, 1858.

In making an independent examination of this subject it is necessary first to examine the alleged causes of senile enlargement of the prostate, and show why many of them have no title to be so regarded. And first, inflammation will be eliminated from the category, the enlargement of the gland which takes place in youth and middle age, having no relation to that which occurs in advancing years. Nothing is more calculated to foster erroneous views, than the habit common to many authors of disregarding this important distinction. Thus, 'the complaint' is said to be 'very common among elderly persons, but occasionally met with also in early manhood.' But no two affections can be more different than those which are thus confounded. In youth, the organ becomes enlarged by interstitial plastic effusion, the result of inflammatory action. In age, there is an unnatural development or overgrowth of the prostatic tissue itself. Histological examination of its elements, already considered, shows that the redundant parts are in no way due to the inflammatory process, in any of its modifications. There can be no pretence that the enlargement which is constituted by undue production of the fibrous and muscular elements, whether in the diffused form or in that of tumour or outgrowth, is a product, direct or indirect, of inflammation in any part of the canal. The newly formed tissues are not the result of morbid deposit dissimilar to the organisation to which they are added, but of an immoderate development of the elements proper of the part. The action of inflammation, and the deposit of its products in a tissue, so far from favouring growth, is directly antagonistic to such a process. A prostate, therefore, which has been enlarged by inflammatory effusion, *cæteris paribus*, might perhaps be considered less likely subsequently to exhibit an hypertrophic tendency, nutrition being rather impeded by the process, not encouraged. Inflammation must, therefore, be excluded from the list of causes.

Stricture of the urethra, and calculus of the bladder, are frequently stated to give rise, probably by causing local irritation, to hypertrophy of the prostate. Respecting the first, the fact, as determined by numerous observations of the dead body, and careful examinations of the living, is, that a coexistence of stricture and senile enlargement of the prostate is certainly not common. Obstruction to a catheter encountered beyond the stricture, and produced either by enlarged lacunæ, dilated urethra, or undue development of the muscular structures of the neck of the bladder, constituting more or less of a barrier there, is by no means rare. And it is a common error to attribute the difficulty, not to its true cause but to an enlarged prostate, since the practitioner is mostly more familiar with that condition than with the obstacle aforementioned.

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[1] *Recherches Anatomiques, Pathologiques et Thérapeutiques sur les Maladies des Organes Urinaires et Génitaux, considérées spécialement chez les Hommes âgés*, chap. iv. pp. 218–233. Par L. Auguste Mercier. Paris, 1841.

Habitual engorgement of hæmorrhoidal and prostatic veins is very confidently held by many as among the best-established causes of enlargement. In this manner, sedentary occupations are considered as predisposing causes. Anything which tends to obstruct the return of venous blood from the pelvis, such as mesenteric or hepatic obstruction, or the like, is ranged under this head. Great stress is laid by some writers upon the venous enlargement and stasis which elderly persons in particular are not uncommonly the subjects of. Undoubtedly, hæmorrhoidal swellings are thus produced, and most frequently. But is there any analogy between this effect and that observed in enlarged prostate? between congestion and thickening of tissues, by exudation from overcharged blood-vessels, and the new formation of normal structures? Do varicose veins lead to the latter result in any other part of the body? Assuredly not. The effect of venous stasis in the leg may often be seen in thickening of the integuments, and distension of the capillaries from which the veins arise, in the occasional occurrence of inflammatory action and consequent exudations or deposits into interstices of structure, but never in the increased production of pre-existing normal and healthy tissue. True hypertrophy, outgrowth, or tumour—not one of them has venous congestion for a cause. Venous congestion impairs structure, diminishes its vitality, and, often enough, predisposes to ulceration the tissues affected by it, so that a slight injury produces the destructive process, but it never augments the vital force, or stimulates growth. On these grounds, then, it must be dismissed from the list of causes of hypertrophy of the prostate.

Gout and rheumatism have been made to perform a part in the category of causes in this, as in that of almost every other obscure affection; but without the smallest foundation in observed facts. Elderly people often have rheumatism, and are subject to enlarged prostate. I confess, after a careful investigation of the subject, that I know of no closer relation between the two affections. Nor can more be said of gout. That either diathesis has any causal relation to the prostatic complaint there is not the slightest ground for believing.

There is not the least foundation for regarding syphilis as a cause. Perhaps it is not possible to speak with the same degree of confidence in regard of sexual excess. Much influence in producing hypertrophy has been attributed to the effect of habitual indulgence of this kind; but, from the fact that the affection has been observed to occur in individuals known to have been remarkable for chastity, the opposite extreme of continence has been, therefore, regarded as exercising a similar influence. In regard to the first, it appears reasonable to believe that repeated use may induce hypertrophy here as elsewhere; while without entering upon the question of the prostatic function, it is impossible not to associate the organ with the sexual act; and, admitting these, it appears not to be easy to escape the inference that hypertrophy may possibly result from sexual excess. Yet facts do not favour this view; hypertrophy does not exist when the function is in greatest vigour, and is not called into immediate existence by the most licentious excesses indulged during the prime of life. And it must be admitted that, when in any part of the body an hypertrophy is developed, it is coincident with, or, at all events, immediately follows, the increased action which induced it. Such is the universal law, and illustrations of its action must be familiar to all.

Supposing, for argument's sake, that we regard the prostate as a secreting gland in the fullest sense of the term, its enlargement cannot be considered as affording a parallel, or even a very similar pathological result, to that which occurs in hypertrophy of other such glands. All its component tissues are not augmented in their relative proportions. There is no analogy between its enlargement and that of an hypertrophied kidney, for example. Considerable augmentation in bulk may take place in the prostate, when the glandular elements appear not to be increased at all, or very little, and that in either case, whether defined tumour be present or not. It is also true that occasionally the glandular elements also are considerably developed.

On the other hand, suppose the prostate to be regarded as a muscular organ, which is permeated by a glandular apparatus, and that its hypertrophy may be compared to that of the uterus or bladder, both of which, when in that condition, maintain the glandular tubes and follicles which belong to their lining membrane unaltered. A consideration of the structure and position of the prostate has suggested that its function is partly a mechanical one, and, so far, analogous to the two organs just named. It has been regarded as an important portion of a muscular apparatus bearing pretty nearly the same relation to the seminal fluids, as regards the act of propulsion, as the bladder does to the urine.[1]

But that the enlargement of the prostate is not a mere muscular hypertrophy, induced by increased action, and corresponding with the degree of augmented function excited, is proved by the facts just adduced of its non-appearance during the terms of youth and prime manhood.

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[1] Professor Ellis says, in a paper already referred to: 'It (the prostate) may be considered as only an advanced portion of the circular layer of the bladder, though it must have the power of acting independently of the vesical fibres, as, for instance, in the propulsion of the seminal fluid. Its chief office will probably be to hurry on the semen, and deliver this into the grasp of the voluntary muscular fibres of the constrictor urethræ.'—*Med.-Chir. Trans.* vol. xxxix. p. 332. 1856.

Nevertheless, viewing the phenomenon as involving an overgrowth of the involuntary muscle, a condition the existence of which cannot be disputed, whatever be the opinion held as to the function of the organ, we may inquire whether the causes of such overgrowth in other parts of the body, similarly constituted, have been ascertained; and if so, whether anything may be gained by analogical reasoning in elucidation of the subject before us.

There is but one other organ in the body which is similarly constituted as regards the nature of its structures, and in the manner of their aggregation, a fact enlarged upon in the preceding chapter. The uterus, like the prostate, is composed of the inorganic muscular tissue distributed in thick strata, so as in either case to form a thick mass, not in thin planes, as found in all the other organs in which this tissue appears. The tendency to become the seat of local and general development of isolated tumours, and outgrowths of a special character, which both organs equally manifest, has also been demonstrated. Starting from this obvious fact, it is difficult to resist the inference that the tendency to overgrowth, the disposition to generate fresh elements identical in character with those proper to the structure of the organs, has a source common to both, and perhaps inherent as a kind of structural, or perhaps functional, necessity. The capability of this structure for exhibiting rapid and enormous increase under certain circumstances is admirably exemplified by what happens to the gravid uterus. A dormant force is awakened through the presence of the impregnated ovum, and the weight and bulk of the organ are in a few months increased tenfold. Active determination of blood takes place, and doubtless supplies the materials of nutrition, which cannot be contributed by venous congestion, nor by any one of the numerous alleged causes of prostatic overgrowth already referred to. But the uterine function having ceased temporarily or permanently, the organ diminishes and returns, sooner or later, nearly to its original size. During the latter moiety of the term of reproductive activity, the uterus is exceedingly prone to develop formations, identical in structure with its own, but more or less isolated from the parent tissues, either in the form of tumours or outgrowths, and these are associated with general development of the normal parts of the organ. These phenomena are observed, perhaps, with greater frequency in the virgin than in the impregnated female, showing that they do not depend upon any force called into play by pregnancy, but on one irrespective of it, and possibly inherent in the structure of the organ, or associated intimately with some function peculiar to it.

It is an interesting circumstance that the prostate, male homologue of the uterus, should exhibit certain analogies with the latter organ in regard of its tendency to overgrowth. The most obvious explanation, and the conclusion which, after a careful examination of the subject, is that which appears to me better supported than any other, seems to be offered in the simple fact now completely established, that the structure in both is exceedingly prone to develop (as already shown, Chapter VII.), among its component elements, minute independent or isolated formations, possessing an organisation identical with itself; which formations, in the majority of cases, do not increase beyond a certain very limited size, and do not interfere with the performance of any known function in either sex, but which, in exceptional instances, continue to be developed, for the most part only, during a certain limited period of life, say, in general terms, between thirty-five and fifty in the female, and between fifty and seventy in the male; in the one case appearing in the form of uterine hypertrophy or tumour, in the other in that of prostatic hypertrophy or tumour. Whether the formation of these products is anything more than a contingency of structure, that is, whether it be connected with any functional action common to the structure in both cases, is more doubtful.

Anatomical examination of the enlarged organs, prostate and uterus, demonstrates the arteries and veins to be both enlarged, the latter, probably, as a result of the former. An increased supply of arterial blood is coincident with the increasing size of the organ; but whether the vascular determination precedes or closely follows the commencing development it would not be easy to affirm.

Are there any circumstances in the mode of life, or of pre-existing disease, which we are warranted by reasonable evidence in considering causes of senile enlargement? I know of none. The fact that almost all known causes of diseases in general have been alleged to be so, of this one in particular—what is it, in reality, but a tacit expression of the same opinion? Every diathesis—gouty, rheumatic, tubercular, syphilitic—has been arraigned as the offending cause. Every form of local excitement possible to the pelvic viscera has been similarly held accountable. Thus it follows that the bearing of any single circumstance becomes neutralised in the concourse of numbers. Every proposition finds its refutation in the presence of some other one among the multitude.

The origin of prostatic overgrowth being thus attributed to a necessity of structure, circumstances which tend to induce active determination of blood to the locality may aid in its development. Thus we find emotional excitement of a sexual kind, and actual excesses, over-stimulating food, sedentary habits, horse exercise, and many other conditions having a like tendency, enumerated among the causes of this affection. But the *initial* step in the causation of enlargement appears to be independent of, and probably uninfluenced by, any of these circumstances, although they may tend to increase already existing disease. Hence something perhaps may be done by judicious treatment to retard the progress of structural changes in the prostate, since their tendency to occur is an exceptional condition, and not a necessary or frequent occurrence even among men of advanced age, as will now appear. All that tends to diminish the local supply of arterial blood to the organ may be held to favour the condition of *status quo*, or slow increase. This, however, is not the place to enter further on the subject of treatment; the allusion made is sufficient to illustrate the question under consideration.

We have now to inquire what are the peculiar conditions, actually ascertainable by inquiry, under which senile enlargement of the prostate, or tendency thereto, is developed.

It never appears but in advanced years. But it is not, therefore, a natural or necessary concomitant of age. It is, on the contrary, a condition which a very large majority of elderly men escape. Contrary to the generally received opinion, its occurrence is not normal but exceptional. An analysis of various particulars given of the dissection of 164 prostates from individuals at and over 60 years of age (see Chapter II.), presents an opportunity of determining with tolerable accuracy the average proportion of cases in which, after that year has been reached, the organ may be expected to become the subject of a morbid increase or diminution in size.

Of 164 individuals, ranging between 60 and 94 years of age, in 97 the prostate was unaffected by either change.

Of the remaining 67, 11 were affected by atrophy, and 56 by enlargement.

Of the 56 cases of enlargement, 26 were marked specimens, *i.e.*, examples which weighed 10 drs. and upwards (10 drs. to 48 drs.). The other 30 were slighter but undoubted examples ($5\frac{3}{4}$ drs. to $9\frac{3}{4}$ drs.).

Of the 164, 57 were the subjects of isolated tumour in the prostate. In about one-fourth of these cases the organ did not exceed the natural weight, they are therefore not ranked with enlarged prostates; in the remaining three-fourths, tumour and enlargement coexisted.

Of the 56 cases of enlargement, nearly one-half made no complaint respecting symptoms during life. It is to be recollected, however, that it is exceedingly common for slight deviations from the normal function to take place in elderly persons without complaint being made; it is not, therefore, to be inferred that no symptoms of the existing enlargement were present. Most probably, an inquiry would have elicited the fact, that it was the habit of many of these patients to rise two or three times during the night to relieve the bladder, and that during the day their frequency of micturition was greater than that of the healthy subject.

With the present data, therefore, it appears that actual enlargement of the prostate exists in about 34 per cent. of men at and above 60 years of age.

That it produces manifest, although only slight, symptoms in about 15 or 16 per cent.

The following results of this investigation are extremely interesting.

The mean age of the 108 individuals unaffected with enlargement was 75·02 years.

The mean age of the 56 individuals affected with enlargement was 75·03 years. For all purposes the two amounts must be regarded as identical.

The mean age of those in whom the enlargement was considerable, 26 in number, was 74·46 years.

The mean age of those in whom the enlargement was less considerable, 30 in number, was 75·53 years.

It must be borne in mind that all these cases were placed in favourable hygienic conditions, and had the benefit of constant and careful medical supervision. Had they wanted, both or either of these advantages, the result might have been greatly different. Prolongation of life in the later stages of the affection depends mainly on the concurring existence of the two conditions named. This fact is one of considerable importance, and ought to be known to those who are the subjects of this complaint, since they are often prone to regard it as necessarily tending to shorten the natural term of life. They are entitled to the benefit which a more cheering view of their condition and prospects cannot fail, in most instances, to impart.

Among the 108 unaffected by enlargement, were individuals of greater age than any among the affected portion; for example, three above 90, and many above 80 years of age. But among the 56 enlarged, there were no less than 14 of 80 years and upwards, one reaching 87.

Besides the 164 cases thus analysed, there were 20 specimens below 60 years of age, which formed part of my first series of 50. Among them were 13 cases between 50 and 60 years; only one of these exhibited any signs of enlargement; the age was 56 years; the enlargement was slight, evidently in the early stage, and affecting pretty equally the whole organ.

The period of life between 55 and 65 is that during which the affection most commonly begins to be developed. I have never been able to meet with an instance of its occurrence at so early a period as 53 years of age. On the other hand, it appears rarely to commence after 70. Where it exists, the disease has generally made considerable progress before 70 or 75. Consequently, it is met with but unfrequently in later years, and is exceptional after 80 or 85. It is not altogether unknown, however, rare examples having been met with at a much more advanced age. Dr. Beith has placed on record a case in which prostatic enlargement, and sacculated bladder as its consequence, formed the only abnormal conditions observable in the body of a man who died at the age of 103.[1]

It may then be regarded as established by these facts, that senile enlargement of the prostate, so far from being a change invariably, or even usually, present in elderly men, is an exceptional condition. But it may be further regarded as probable, that a slight tendency thereto, almost, if not quite, unrecognisable during life, occurs in about one out of three individuals after 60 years, and that appreciable enlargement may be met with in one out of seven or eight, at that age and upwards.

It is germane to this subject to remark here, that, on the other hand, atrophy does not appear to be an effect of old age when enlargement is not present, as has been alleged. This subject will be further examined in a subsequent chapter, devoted to the consideration of Atrophic Changes in the Prostate.

CHAPTER IX.

THE SYMPTOMS OF THE ENLARGED PROSTATE OF ELDERLY MEN.

Onset of Symptoms sometimes very gradual—Sometimes sudden—Phenomena first noticed—Those which subsequently occur in their order—Incontinence or Overflow—Importance of defining Terms—Characters of Urine—Nature of 'Ropy Mucus'—Complication with Calculus—Bladder often much distended before existence of the Complaint is discovered—Last Stage.

It may be very safely affirmed that in the earliest stage of enlargement of the prostate, there are no symptoms sufficiently obvious to attract the attention of the patient. It is probable, indeed, that a very considerable period, varying in different cases from a few months to some years, is passed between the actual commencement of enlargement, and the occurrence of anything which is observed to be unusual in the act of micturition, or of any other form of derangement produced by the organic changes which are taking place. The length of time which elapses between the onset of disease and the manifestations of symptoms, depends mainly upon two conditions: first, upon the character of the enlargement itself; and secondly, upon the constitution of the patient.

In respect of the first condition named, we have already observed (p. 61), and shall again have to remark how much the nature of the enlargement influences not only the severity, but the kind of symptoms produced. It will, moreover, be apparent that even a considerable enlargement of one portion of the organ may produce little or no inconvenience for a long period, while a much slighter increase, otherwise situated, may be the cause of great disturbance, both locally and generally.

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[1] *Trans. Path. Soc.*, 1850–51, p. 124.

Secondly: in these cases, as in all others, must be considered the patient's idiosyncrasy, which in one instance enables him to withstand the inroads of disease, and to a great extent adapt his constitution to altered circumstances; and in another disposes it to yield, without much attempt to rally, to the morbid influences to which it is subjected.

Taking into account the variations which are thus encountered in the observations of numerous cases, the symptoms exhibited may be described as taking generally the following form and order of appearance. I may premise, however, that it is not easy to regard the course of the malady as naturally divided into several distinct periods, or as developed through the occurrence of definite stages; although it may aid the student's memory thus to regard the subject. The case in general steadily, but very gradually, proceeds from the first and slightest sign of the affection towards the worst and most advanced phase, unless held in check, as it often is, by the judicious use of the catheter. Nevertheless, the order of the symptoms is almost always uniform, although the degree of development the disease may have reached when first observed varies greatly in different cases. Thus it occasionally happens that the occurrence of complete retention of urine after some obvious exciting cause, as exposure to cold, &c., is the first announcement of the existence of prostatic enlargement.

When, however, this is not the case, one of the earliest signs generally observable is a manifest diminution in the force with which the urine is ejected. The urine also makes its appearance less quickly than natural after the effort to expel it has been made, and a certain hesitation or uncertainty is experienced before a stream is fairly established. The size of this is not necessarily much smaller than it was in health, but the current falls perpendicularly, or at all events cannot be projected so far by the ordinary amount of effort, neither can its force be much augmented by additional effort. On the other hand a precisely opposite effect is attained by muscular effort in stricture of the urethra, where, however feeble the stream, increased action of the bladder almost invariably tells to some extent upon it. Indeed, there is no doubt that, in some forms of prostatic enlargement, increased efforts to make water do but augment the difficulty in micturition. A powerful contraction on the part of the bladder appears in such cases to add to the obstruction at its neck, a result which it is not difficult to understand when we observe the form which examination of the parts sometimes reveals.

Then the necessity to pass water becomes more frequent than natural as the complaint advances, not being much felt at first, and there is not the satisfaction following an act of micturition which is ordinarily experienced in health. Frequently the want occurs again in a few minutes, especially after the first effort on rising in the morning, when the bladder has become distended during sleep. One, two, or even more repetitions of the act are called for perhaps while dressing, as if the bladder only regained its power by slow instalments, and so gradually awoke to the fulfilment of duty. In course of time, however, the act must be more repeatedly performed, and night is often disturbed by calls to pass water, although there is little or no undue frequency during the day.

A sense of weight, fulness, or uneasiness about the perineum, rectum, and hypogastrium is felt, which the patient soon, almost instinctively as it were, learns to refer to the neck of the bladder. Pains in the groins, testicles, and thighs are sometimes complained of, as the complaint advances. As the expulsive efforts to pass water become more feeble, irritation of the rectum is experienced in a greater or less degree; the contents of the bowels are more frequently passed from inability on the part of the patient to prevent the act of defæcation accompanying that of micturition; and tenesmus, protrusion of the mucous membrane or prolapsus, and hæmorrhoidal swellings, are apt to result. The associated action of the bowel is, perhaps, more likely to take place, if the enlargement of the prostate is developed in a direction backwards into the bowel, rather than forwards into the bladder. In this manner, a constant sensation of the existence of some matter in the bowel requiring removal is occasioned, and unavailing efforts are made to obtain relief at stool. Much stress has been laid by some writers, following J. L. Petit, who seems to have originated the idea,[1] on the appearance of flattened stools, as an indication of this form of enlargement, but without sufficient grounds. No doubt that in some cases the motions are passed in the form described, but this is an effect, not of enlarged prostate, but of some action of the sphincter ani, which exercises the chief influence in shaping the fœcal mass. I have seen many patients in each of whom the bowel was largely occupied by the prostate, who habitually passed stools of ordinary form and size.

As the disease advances, pains directly associated with the condition of the bladder begin to be complained of. A more or less constant aching sensation behind or about the pubes which usually attends on distended bladder or severe chronic inflammation of that organ, is a trying symptom. Soreness in the urethra is frequently felt; and an aching or shooting pain extending to the glans penis is occasionally complained of.

[1] *Traité des Maladies Chirurg.*, tome iii. p. 34. Par J. L. Petit; ouvrage posthume. Paris, 1790.

The urine is perceived to have an unpleasant odour, at first slight, and described as 'fishy,' becoming subsequently ammoniacal, pungent, and more or less putrid and offensive. Some patients are very sensitive to the slightest change in odour, and the consciousness of its presence is a source of great discomfort. At the same time some muco-purulent discharge may appear by the urethra; this varies with circumstances, occurring after exposure to cold or damp; or with an attack of retention; or with exacerbation of all the symptoms, depending, perhaps, on a constipated state of the bowels; and then subsiding rapidly under appropriate treatment. At such times the testicles occasionally become tender, and slightly swollen; while the urine is expelled with greater difficulty, or requires to be drawn off for a few days by the catheter. Vascular excitement of the penis, producing frequent erections of a non-sexual character, is by no means an uncommon symptom.

Meantime as the complaint progresses, it is obvious that the bladder fails to empty itself, although the efforts to obtain relief are frequent and fatiguing. While in very rare cases the effect of growing enlargement is to open the neck of the bladder, and occasion a real incontinence of urine, the general result is, that the urethro-vesical outlet is more firmly closed, and requires a preternatural amount of contractile effort in order to drive the fluid through it. Hence the bladder is never emptied, its contents below a certain level not being expelled: an act of micturition requiring for its performance the presence of a quantity of fluid adequate to distend the viscus, so as to render available the elasticity of the vesical walls, as well as the action of the abdominal muscles, which latter tells with greater force in proportion as the size of the organ is increased. It is obvious that distension of the bladder if unrelieved by the catheter must inevitably increase; the capacity yielding to a constantly augmenting demand. Hence it becomes at length habitually overdistended, and a little surplus only flows off at each act of micturition, and that not by a stream, but by a succession of drops. At night, when voluntary control is suspended by sleep, urine drains away, to the great discomfort of the patient. At length the same thing happens by day also, rendering the condition of the sufferer painful in the extreme, his person and clothes exhaling an offensive odour of the decomposed secretion.

The condition above-described is generally spoken of as incontinence, a misapplication of the term, as we shall hereafter see, which has been productive of fatal errors in practice. A much better term is that employed, first I believe by Mercier, namely, 'regorgement' (overflow); as aptly indicating a condition which, so far from being one in which the bladder *cannot retain*, is one in which it *retains too much*. In my work on 'Stricture of the Urethra,' published in 1858, for the express purpose of avoiding any misunderstanding of the condition described, I employed, in order to denote it, the phrase 'retention with incontinence.' At the same time there can be no objection to the shorter term 'overflow;' the real need being that there should be no room for overlooking the cardinal fact, viz., that the bladder is seriously distended with urine.

As the complaint advances, it becomes difficult to commence the act of micturition, much straining taking place before the obstruction at the neck of the bladder is overcome, and the urine begins to issue. The patient is sometimes compelled to lean forward in order to increase the pressure on the abdomen and so exert more force on the bladder. Indeed, so forcible are his exertions, that an abdominal hernia is not unfrequently caused.

These circumstances too are aggravated by the large increase in quantity of urine often secreted, doubling or even trebling as it does the ordinary amount passed in health, although it is of course urine of low specific gravity. It is an additional hardship for the patient that secretion takes place more rapidly during the night than in the day, a well-known fact which has suggested the view that sleep may promote for these patients the action of the kidneys, since it is certainly not due to the mere position of recumbency, often retained as it is throughout the day without any such effect. Yet repose is so much broken in the circumstances described, that it is difficult to conceive nocturnal hyperactivity of the kidneys to be due solely to a state of nervous system induced merely through the action of sleep.

When the condition described continues without relief, the general health suffers much from pain and broken rest. Slight chills, capricious appetite, thirst, decreasing strength, and liability to illness after slight exposure, manifest the steady progress of organic disease. The kidneys are liable to become injured through the long-continued impediment to the discharge of urine. Sooner or later such signs indicate an extension of chronic change affecting the ureters, the pelves of the kidneys, while the power of renal excretion is diminished, entailing slowly the inevitable dangers of that condition. Hence uræmic poisoning, inducing coma and death, is one of the modes by which the fatal event sometimes takes place, more especially when the sufferer has been a victim of the disease unchecked in its course, and unrelieved by art.

The occurrence of hæmorrhage to a trifling extent is a frequent accompaniment of the complaint. Undoubtedly it sometimes relieves congestion, and may be to a certain degree salutary: often it occurs after exposure to cold, sexual excitement, or other circumstances which tend to produce a vascular determination to the pelvic viscera. But more frequently it has its origin in an imprudent use of the catheter; and it may then happen to an alarming extent.

The characters presented by the urine should be noted. They are such as arise from decomposition of some of its constituents from abnormal retention, mixed with the products of chronic inflammation of the bladder. Accordingly the first deviation from health noted by the naked eye is that it is no longer transparent, but a little cloudy, often pale, with a few shreds or flocculi suspended in it. More or less of mucous deposit slowly appears at the lower part of the vessel containing the urine after standing. A thin pellicle forms on the surface, more or less whitish and opaque, sometimes iridescent. In later stages the mucus increases in quantity, and appears as the glairy, tenacious, slimy, adhesive matter so well known to be associated with chronic inflammation of the bladder; not miscible with the urine, it adheres to the side of the vessel, and follows the urine as it is poured out from one to another, in a mass which it is difficult to separate. In advanced cases this mucus sometimes contains traces of calculous, generally phosphatic, matter, in the form of small amorphous greyish or whitish masses of soft consistence. When the mucus has subsided, there is sometimes deposited upon it an opaque creamy-looking layer, which is unaltered pus, mixed with crystals of the triple phosphate in varying quantity.[1] In any stage of the complaint before such matters are observed in the urine, or long after their appearance, the urine may be darkened in colour from admixture with blood. The tint is not necessarily red, except from recently effused blood, and then arising, perhaps, from the employment of instruments. It is often of a reddish brown or dirty hue, which the colouring matter of the blood assumes after mixture with urine, especially when somewhat decomposed.

The chemical reaction of the secretion is at first neutral, then alkaline in various degrees of intensity. The odour is pungent, ammoniacal, often fœtid, sometimes extremely so. The quantity often varies considerably in the same patient from day to day; the measure being sometimes below, but more generally much above, the natural or healthy standard. And, as has been already pointed out, it is frequently secreted more rapidly, but of low specific gravity, during the night than during the day.

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[1] The so-called mucus, which is frequently passed in very large quantities from the bladder, is usually a compound of pus and mucus, in variable proportions. It has by some been considered as merely pus rendered viscid by the addition of alkali. After repeated careful observations, chemical and microscopical, I find that its composition may be very different in different cases. In some it appears, after the addition of very dilute acetic acid, sufficient only to neutralise the alkalinity of the fluid, to be made up almost entirely of corpuscles, with multiple or irregular nuclei: in such cases, I presume, it is altered pus, and little else. In other instances the proportion of the corpuscles is very small in quantity when compared with that of the amorphous or very faintly striated viscid fluid in which they are suspended, which appearance shows that the secretion proper of the mucous membrane is the chief component, resembling, indeed, a nasal catarrh.

Under the microscope may be observed tesselated and spheroidal epithelium in abundance, blood corpuscles, and pus corpuscles. Besides these, there are usually many of the prismatic crystals of the triple phosphate of ammonia and magnesia in great variety of form and size, and the amorphous phosphate of lime. Other crystalline forms may be present also, such as uric acid and oxalates, but the first-named constitute the typical forms which are present in the urine of these cases. Albumen is not present until introduced either by the admixture of blood or pus; and then, of course, it has no significance beyond that which the blood or pus themselves possess. It may occur in later stages from the production of muco-pus in any part of the urinary tract; and of course, where active inflammation affects the renal structure itself, when casts may be present, and albumen may be present in considerable quantity, a situation of extreme gravity. But it is not common that degeneration of the kidney with true albuminuria is associated with enlargement of the prostate, nor, indeed, has this local condition any influence in producing any form of Bright's disease. This remark might well be deemed superfluous were it not for the strong tendency, manifested by medical men generally, to lay some emphasis on the mere presence of albumen in the urine of patients affected solely by derangements of the bladder, prostate, and urethra, and deriving it obviously from such local sources.

As a result of long-continued disorder in the urinary apparatus, and of the changes in the urine itself, which have been thus described, it is not surprising that the formation of calculus not uncommonly takes place. Its presence will be suspected if there is much pain during and after the act of passing urine, if pain at the end of the penis is severe, if blood is frequently seen, and if these signs are manifestly increased by exercise. Furthermore, small fragments of calculous matter may from time to time be passed. But it is also true that the existence of calculus is sometimes masked by prostatic disease; in the first place because many of the symptoms are common to the two disorders; and secondly, because the conformation which the neck of the bladder assumes in the latter affection tends to prevent the occurrence, in some measure, of the most distinctive symptoms of stone; inasmuch as the foreign body is less liable to be engaged in the vesical neck, but lies back deeply behind the enlarged prostate. Hence, the pain immediately following micturition may be less obvious in this condition, and yet a calculus may be present, and be the source of irritation of which the calculus, and not the prostate, may be in greater part the cause.

The same modification of calculous symptoms is favoured by atony of the bladder, the coats of the viscus not closing upon the calculus, and so not producing the pain occasioned by the contraction which follows the act of micturition from a healthy bladder.

But, although such is the ordinary course of unrelieved hypertrophy of the prostate, the earliest symptoms of this affection are not always observed in the form and order of gradual progression here presented. On the contrary it is by no means uncommon for an attack of complete retention first to reveal the presence of the disease. Its progress may not have been rapid in these circumstances; but the impeded function, although, probably, of long duration, has not excited any very obvious symptoms. The impediment has often long existed when its presence has been least suspected. A patient, for example, who passes a sufficient quantity of urine daily, without particular effort, although more frequently than natural, who is conscious, it may be, of some little escape involuntarily during sleep, or even in the day on making any strong muscular effort, is very apt to think that his urine passes perhaps too freely; but does not suspect the existence of any obstruction in the urinary outlet. The condition of such a patient, too, is sometimes overlooked, even by his medical attendant, and no specific investigation is made. The apparent freedom of micturition has masked the real malady, and the treatment is directed only to those symptoms which have been productive of most discomfort or anxiety to the patient; it may be, only to the general *malaise*, or some febrile condition, not uncommonly resulting from the hidden cause. The march of events, however, must ultimately arouse suspicion as to the state of the bladder; a catheter is passed, and greatly to the astonishment of the patient, and sometimes scarcely less so to that of his attendant, some thirty or forty ounces of urine, or even a much larger quantity, may be drawn off, notwithstanding that the act of micturition has been just performed. Now, it is during the prevalence of such a state of things that unaccustomed exposure to cold or damp, or undue indulgence in alcoholic drink, or the like, may suddenly produce congestion of the already enlarged prostate; and a condition of complete retention may be the first occasion of discovering the existence of the affection. After this the habitual distension may be lessened by the daily use of the catheter, but the bladder rarely regains the power of evacuating its contents completely when unnatural retention has existed for some months or for a year or two.

The last stage of the complaint may be indicated more by the signs of a gradual decline of the powers of life, than by those of advancing obstruction; on the other hand, the final symptoms are sometimes those of depression, consequent on acute cystitis, and frequent hæmorrhage, with or without the infliction of instrumental injury; or of gradual exhaustion, from constant discharge of pus and mucus from the bladder and ureters; or, lastly, of uræmic poisoning of the system, from the failure of the eliminating function of the kidney.

There are certain physical signs which may be manifested as the result of advanced enlargement, one of which should be noted here. It is the existence of dulness on percussion above the pubes, and the degree to which it extends. In some instances the bladder may be felt as a rounded body, or may produce visible fulness in that situation; and this from only a finger's breadth or two above the symphysis, up to a level even with the umbilicus. But it is by no means to be concluded, because dulness or percussion or prominence are absent, that retention of urine is not present. There may be habitual retention, with a constant residuum after micturition of ten or even fifteen ounces, and yet no sign thereof may appear in the situation named. The further examination of the condition which these signs and symptoms indicate will be considered in its place hereafter.

CHAPTER X.

THE EFFECTS OF ENLARGED PROSTATE IN RELATION TO THE FUNCTION OF MICTURITION—RETENTION—INCONTINENCE—ENGORGEMENT AND OVERFLOW.

Retention of Urine, more or less considerable, the general result of Enlarged Prostate—Contrast between Retention and Incontinence—Retention due to Obstruction, not to Paralysis—True Paralysis of the Bladder extremely rare, except from Lesion of a Nervous Centre—Overdistension and Atony of the Bladder—Tabular View, showing various degrees of Obstruction and corresponding Results—Engorgement and Overflow—Importance of last-named Symptom—Commonly confounded with Incontinence—When does real Incontinence exist?—The Effects on the act of Micturition produced by the various Organic Changes in the Bladder, Ureters, &c., which occur as the Result of Enlarged Prostate.

MECHANICAL obstruction, which may be situated either at the neck of the bladder or in the urethra, is the chief cause of chronic retention of urine; that is, a state in which the patient, being unable by his natural efforts to empty the bladder, retains there a certain portion of urine, which varies considerably in quantity, just as the amount of obstruction itself varies. No doubt that Atony of the bladder itself, to be considered hereafter, arising either from impaired function of the muscles or from disappearance of the muscular elements, is often in part the source of the inability.

But by far the most common cause of the condition is enlarged prostate; and when obstruction is considerable, it may happen that no urine at all is passed by voluntary effort. The bladder then becomes permanently distended, and the fluid gradually increasing in quantity, at length opens the orifice, and flows off spontaneously. To designate this phenomenon the term incontinence was originally applied, and is still employed by many, although it is incontestable that the condition so described is in reality the very reverse of *incontinence*, since the bladder already contains too much, often much more even than its capacity, in a state of health, would admit, and it is the surplus only which is forced out. The bladder is in fact *engorged*, the urine *overflows*, and involuntary micturition is the consequence.

This phenomenon of involuntary micturition in elderly persons is very frequently accounted for, not on the ground of existing obstruction, but on the supposed presence of paralysis affecting the bladder. It is held that either the neck or the body of the bladder may be separately paralysed, the remaining portion retaining its normal supply of nervous influence—a pathological state the existence of which it would be very difficult if not impossible to prove, and which, if it be an actual occurrence, is certainly extremely rare. On this theory, however, it is said that when the neck is paralysed and the body unaffected, the vesical outlet becomes patent and incapable of contracting, and that the urine flows off as fast as it escapes from the ureters, while the bladder itself remains empty. The term Incontinence has been employed to designate this condition also, although it presents a state which is the exact reverse to that already so described. But in this case, whether a nervous lesion be the cause of the phenomenon or not, the term is appropriate, because the bladder is unable to retain; the condition might, therefore, be accurately described as incontinence of urine.

On the same theory, also, retention of urine is supposed to be caused by the converse form of paralysis of the bladder, that is, when the neck retains its nervous supply, and the body losing it, becomes unable to expel its contents. Thus it will be seen that the term Incontinence comes to be frequently applied to precisely opposite states of the containing function of the bladder. Hence the misunderstanding, the difficulties, and the grave errors in practice which sometimes occur, especially to the student, in connection with this subject.

Now, without discussing here at length the question already raised, as to whether these local deprivations of nervous influence do, or do not, take place—in the one case affecting only the neck of the bladder, at other times the body alone—I have no hesitation in affirming that in a great majority of the cases of habitual retention of urine, with uncontrollable overflow of a portion, the cause is palpable and physical, and not impalpable or dynamical; a fact which in each individual case may be ascertained by examination; in other words, there is *an organic obstruction in some part of the urethra*, situated either at its commencement in the neck of the bladder, where it is usually constituted by enlarged prostate; or in a portion of the canal anterior thereto, where it usually takes the form of permanent or organic stricture.

We are, I believe, indebted to Mercier, of Paris, for first calling attention forcibly to the important fact that organic obstruction, not local paralysis, or impaired nervous supply, is the great, and almost universal, cause of the various states which are described as retention and incontinence, when existing in elderly individuals who present no sign of impaired nervous power in other parts of the body. To his able treatment of the subject I would refer my readers for the arguments in favour of this view.[1] It is not entered upon here, because I have preferred regarding it as a question of fact, rather than as a theme for discussion. The obstruction is, or is not present; if the former, it may generally be verified. Experience alone has led me to reject the impalpable cause, and to appreciate the material one, and to an extent sufficient to warrant me in referring to the fact alone for corroboration of the assertion made above.

In nineteen cases out of twenty, excluding two classes of cases which will be immediately named, the symptoms described are invariably associated with permanent obstruction of some kind, as may generally be verified during life, or, more perfectly, after death. The exceptional cases referred to are, first, those in which there is cerebral or spinal lesion of an organic kind, which paralyses more or less completely the nerve-functions of motion, voluntary and involuntary, of sensation, or of sensation and motion combined, of the whole body, caused by chronic disease or by injury. In such cases the body and neck of the bladder are alike affected; still the almost invariable result is retention and overflow of surplus urine,—the very condition, it may be remarked, which is affirmed on the local paralysis theory (as above shown) to be the result of paralysis of the body and non-paralysis of the neck. Under certain circumstances, paralysis of the bladder may be produced by reflex action, no organic lesion of nervous centres being present; as in severe shock following injury, and the like.

The second exceptional case is that in which a healthy individual voluntarily retains his urine for a considerable period of time, in spite of urgent desire for relief. The not unfrequent result is that the muscular expelling apparatus of the bladder is overstretched, loses its tone, and is more or less unequal to perform contraction in a normal manner. More or less chronic retention results, and will probably continue unless relieved in the ordinary way. To this state also the term paralysis has been applied; but as there is no evidence whatever that the lesion consisted in any loss or impairment of the *nervous* force transmitted to the viscus, it conduces to a better apprehension of the case to call it simply as it is, Overdistension, or, if preferred, Atony of the bladder. It is perfectly gratuitous in such an instance to imagine a lesion in any part of the nervous system to account for the phenomenon, and it is, therefore, undesirable to speak of it as produced by a paralytic condition of the bladder.

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[1] See *Recherches Anat., Path. et Thérap. sur les Maladies des Organes Urinaires et Génitaux, considérées spécialement chez les Hommes âgés*, part ii. chap. i. Par L. Aug. Mercier. Paris, 1841. Also, *Recherches sur les Valvules du Col de la Vessie*, chap. iv. By the same. Paris, 1848. And more recently, by the same author, a paper, 'Sur l'Inertie, ou Atonie de la Vessie,' &c., *Gazette Médicale*, 1854. The local paralysis theory was defended by Civiale, in a reply to the above, in the *Moniteur des Hôpitaux*, Feb. 8, 1855. Mercier's rejoinder appeared in the same journal, April 10 and 12. See, also, these two memoirs, with some additions, in his latest work, *Recherches sur le Traitement des Maladies des Organes Urinaires, &c.*, Paris, 1856.

The phenomena produced by obstruction at the neck of the bladder caused by enlarged prostate, in connection with the function of micturition, may be briefly recapitulated as follows, and connected step by step with the organic changes which arise in the progress of the affection.

OBSTRUCTION AT THE NECK OF THE BLADDER FROM ENLARGED PROSTATE, PRODUCES		ORGANIC RESULTS.
a. Increased efforts to expel urine through obstructed orifice;	giving rise to	Corresponding Hypertrophy of the muscular coats of the Bladder.
b. Inability to effect a complete contraction of the Bladder; and consequent *Retention* of a portion of urine;	"	Dilatation of the Bladder corresponding with the increasing amount of residual urine, the result of augmenting obstruction at the neck.
c. Increased inability to effect contraction of the Bladder from increasing dilatation and overstraining of the muscular coats;	"	Their more or less complete atony.
d. The Bladder becomes *engorged* with urine, the neck is dilated, and a portion *overflows*, irrespective of the will of the patient;	"	Organic changes in the mucous lining of the Bladder; sacculation of the outer coats, and distension of the ureters, &c.

Thus we arrive at an appreciation of terms which, when applied to the morbid states described, simply and clearly denote their meaning:—Retention, Engorgement, Overflow. The term Incontinence is to be employed solely to denote that condition in which the bladder is organically incompetent to contain urine, which therefore issues soon after its entrance by the ureters.

On the other hand, when from any cause the bladder is inflamed, it has little retaining power, and empties itself with undue frequency. To this condition the term Irritability of the bladder is generally applied, as indicating a condition of activity, and therefore one very distinct from Incontinence, which, as we have seen, always implies the presence of a passive condition, in which the urine dribbles off, being neither retained nor expelled.

Real Incontinence, then, is a rare occurrence in the adult male. That it is so is one of the most salutary and important lessons which the student can learn. It should be held as an axiom, the importance of which it is impossible to overrate, that AN INVOLUNTARY FLOW OF URINE INDICATES RETENTION, NOT INCONTINENCE. How often has the overflow of surplus urine from an engorged bladder concealed the real evil from an inexperienced practitioner, and induced the patient to believe that 'his water was too abundant, or passed too freely, and wanted repressing rather than withdrawing'! And what has been his astonishment, when, the true state of matters being recognised by his attendant, the introduction of a catheter has given exit to a pint or more, it may be, of retained urine!

But does Incontinence, that is, organic inability on the part of the bladder to retain urine, ever occur as the result of enlarged prostate? M. Mercier states that he has occasionally found it so produced, and in this manner. He believes that when the enlargement of the organ is uniform, so that each lateral lobe and the median portion (middle lobe) are pretty equally augmented in size, the last-named part acts as a wedge, that it separates the two lateral lobes, and opens out the neck of the bladder, so as to prevent the bladder from retaining the urine. He gives particulars of four cases under his own care, in each of which, at an examination of the body after death, the bladder was found empty, and contracted in size, while the prostate was enlarged considerably, but equally, so that the internal meatus was patent and of a triangular form. During the latter part of life, incontinence had been present in each case, and there had been no retention of urine.[1]

As has been observed in a preceding chapter on the morbid anatomy of the affection, I have not seen in the extensive collections which our museums afford, a parallel instance to these cases of M. Mercier, and must, in consequence, believe it to be a rare result. On the contrary, in prostates similar to those described by him, the bladder is generally much dilated; at all events, is not less than the natural size. Most rarely is it contracted; nor on examining the numerous recorded histories attached to these preparations, does it appear that real incontinence had been present during life. It may be remarked further, also, that the equal development of the three portions does not necessarily produce the opening out of the internal meatus, since the outgrowth from the posterior median portion is almost always directed backwards towards the cavity of the bladder, and presents no appearance of acting as a wedge *between* the lateral lobes, from which, on the contrary, it seems rather to diverge, as if forced out by their lateral pressure. Since the publication of the first edition I have had two or three opportunities of verifying the existence of the condition described, but the infrequency of its occurrence corroborates the statement previously expressed respecting its rarity.

A result which almost uniformly occurs from considerable enlargement of the prostate, is elevation of the urethro-vesical orifice above the floor of the bladder. The entire neck of the organ is pushed up behind the pubes by the enlarging mass, so that what had been originally the most dependent portion of the cavity is no longer on a level, or nearly so, in the standing position of the individual, with the outlet by which the urine has to pass; and a depression exists behind the neck, in which urine may remain, even after it has ceased to flow through a catheter lying just within the bladder. Hence the posture of the patient will sometimes affect the flow of urine; and accordingly, he finds that when kneeling, or in the prone position of the body, he is able to pass water after ceasing to do so in the upright posture. In some few instances, the outgrowth from the median portion having become pyriform, and possessing but a narrow pedicle, the mass is so moveable as to fall forwards upon the vesico-urethral orifice in the manner of a valve, and close it very effectually when the individual is in the upright or in the prone positions. Thus a patient finds by experience that urine passes more freely when he is lying on his side or back, than by any other method. Such a circumstance, which, by the way, is one of rare occurrence, may suggest the presence of this form of enlargement, and this may be verified by means of an exploring sound. (See the following chapter on Diagnosis.)

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[1] *Recherches Anat. Path. et Thér. sur les Maladies des Org. Urin. et Gén.*, pp. 261–273. Par L. Aug. Mercier. Paris, 1841.

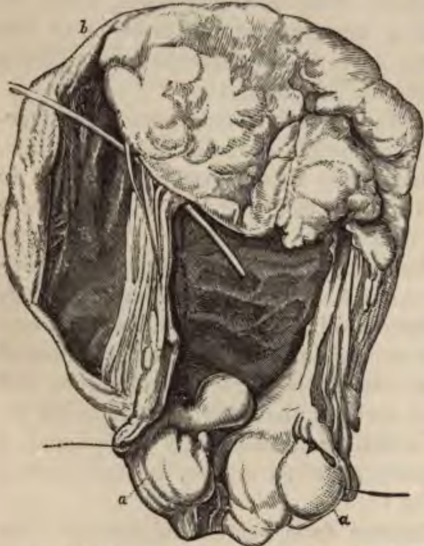
Sometimes, however, when there is not much enlargement, obstruction may occur from the presence of simple tumours in the prostate. While, as we have seen, a prostate may become largely increased in size without causing obstruction to the outflow of urine, one of these small tumours developed at the neck of the bladder may produce complete inability to micturate. The small firm rounded projection which it constitutes, fills up the internal meatus, closes it almost entirely against the natural efforts to relieve the bladder, and renders necessary the aid of the catheter. At the same time, little or no enlargement of the prostate may be present or ascertainable by rectal exploration, and no difference in the length or the curve of the catheter is required for the case. These conditions, which are undoubtedly exceptional, I have nevertheless not infrequently observed during life and verified after death. (See figs. 11 and 14.)

We have thus a condition distinct from general enlargement, but liable, like it, to produce obstruction to the outflow of urine, and chronic retention and engorgement of the bladder, in elderly subjects—a condition which requires similar management also, in all respects. The practical lesson is one which relates to diagnosis; and it is simply this, that we are not to affirm the absence of obstruction of the neck of the bladder, and infer the existence of true paralysis affecting that viscus, when it is unable to empty itself by voluntary efforts, because we discover no enlargement of the organ by rectal or by urethral examination. The obstruction may be, and in these circumstances it not infrequently is, due to the existence of a small rounded tumour developed in the prostate, but projecting into the urethral canal, and usually, although not invariably, in or near to the situation of the uvula vesicæ.

Other circumstances may be briefly named as results of enlarged prostate, and affecting the function of micturition: viz., those arising from the continuous pressure exerted upon the entire urinary tract, behind the point of obstruction. I shall merely name them here, as the whole subject is treated at length in my work on 'Stricture of the Urethra,' chapter the second. The changes thus produced in the containing and excreting organs are, in the main, almost the same, whether the obstruction to outflow is situated in the course of the urethra (stricture), or at the neck of the bladder (prostatic).

Hypertrophy and dilatation of the bladder are the commonest, indeed almost the invariable, results of prostatic enlargement. Hypertrophy and contraction, on the other hand, are more common in stricture of the urethra. Sacculation of the bladder often follows, being produced by protrusion of the mucous membrane outwards, through small interstices between the enlarged fasciculi of the muscular coat. The sac, commencing as a mere indentation, becomes pouch-like, and, in the course of long-standing disease, is distended into a spheroidal cavity, capable of containing several ounces of urine. (See fig. 18.) The presence of these sacs may be suspected during life, when, after the bladder has been completely emptied by a catheter, certain changes of position in the patient's body, in the course of a very few minutes, set free some three or four ounces of very turbid urine. Mr. Guthrie believed that the presence of a sac was proved by the occurrence of what he denominated 'the fluttering blow of the bladder,' communicated through the catheter to the hand of the surgeon. The phenomenon thus described I have repeatedly experienced in circumstances in which there was no evidence of the existence of sacculi, and, indeed, every reason to conclude they were

FIG. 18.



The bladder and prostate of a man aged 76 years, drawn when fresh, and showing a tumour embedded in the interior part of the organ, divided into nearly two equal hemispheres by an incision into the urethra. At the neck of the bladder another eminence is seen, which produced almost total obstruction to the outflow of urine; it consisted of a spheroidal tumour, carrying before it a thin layer of prostatic tissue. On the left is seen a sac communicating with the proper cavity of the bladder by a small opening, in which a slender bougie is placed.

not present; I cannot, therefore, admit it to be a diagnostic sign. The ureters may also become dilated to a considerable extent, and their walls at the same time be hypertrophied. The ureter has even been known to serve the purpose of a subsidiary bladder; in one well-known case it formed a tumour, easily recognised during life when distended, which reached from the pubes to the lower ribs, but which disappeared after catheterism. Dilatation of the pelvis of the kidney follows, and sometimes to such an extent that an organ so affected presents the appearance of a cyst, or congeries of cysts, a condition in which irreparable injury to the renal structure itself has been inflicted. Indeed, the kidney may ultimately almost disappear under the influence of such fluid pressure when long continued. Add to all these effects the noxious action of decomposed urine upon the whole extent of the mucous lining involved; the consequence of which is chronic inflammation, leading to ulcerative and gangrenous processes in various parts.

Such are the principal effects of prostatic obstruction, and the organic changes which take place in the organs behind its seat, as the results of retained urine, not removed by artificial means.

CHAPTER XI.

THE DIAGNOSIS OF PROSTATIC AND OTHER OBSTRUCTIONS AT THE NECK OF THE BLADDER.

Examination by Rectum—Method of conducting it—Points to be verified—Examination by Urethra—By Catheter—By Sound adapted for the purpose—Ordinary Methods of using it—Rigorous determination of Size and Form of Tumour often possible—Diagnosis of Prostatic Enlargement from Stricture of the Urethra—From Calculus of the Bladder—From Tumours of the Bladder—From uncomplicated Chronic Cystitis—From Atony of the Bladder—From Paralysis of the Bladder.

Although an observation of the ordinary symptoms of prostatic enlargement, in an elderly patient, affords good ground for entertaining a pretty correct surmise as to the nature of the complaint, still its existence cannot be asserted without a physical examination.

Just as in the case of suspected stone in the bladder, the sound must reveal the presence of the foreign body, so, in this case, must the finger, and occasionally the sound, recognise the existence of prostatic enlargement, irrespective of the evidence which may be derived from the existence of any symptoms whatever; and they should also define, as far as possible, what are its nature and extent.

The test which is chiefly depended on by the surgeon is an examination, by means of the finger, in the rectum. It is so familiarly known and commonly employed, that it might be deemed superfluous to enter into details respecting the method of applying it. The student, however, or any one unpractised in such explorations, will learn little by employing them, unless he has attained some previous knowledge by experience, of the size and form of the prostate in health, and his study will be facilitated by some preliminary hints.

The patient should, as a rule, lie on his back upon a couch, and the surgeon stand on either side, so that the forefinger of one hand may be employed in the rectum, while the other hand is free to use a catheter, or press on the abdomen, as required, since by concerted movements for either purpose, more accurate information may sometimes be obtained than by either exploration conducted separately. The patient's knees being drawn up and separated from each other, the finger, well covered with grease or vaseline, should be made to glide very slowly and gently through the sphincter, so that, when introduced as far as possible, two phalanges are free to move in the bowel. Supposing the student to be examining a healthy subject, he may first endeavour to define immediately within the ring of the sphincter, through the anterior wall of the bowel, which recedes at this point, the termination of the bulb of the urethra, or, at all events, the membranous portion, continuing as a rounded line from the former. Next the apex of the prostate is distinguished, and gradually widening out, the body, which is firm to the touch, with an outline distinctly suggesting that of a flattened chestnut; the finger will readily appreciate a slight depression marking the line of the urethra, between its two lateral lobes, and may glide over the outer borders of the latter, into a hollow on either side; it may then pass further backwards in the median line, until the firm prostate is no longer felt, but the more yielding tissues of the bladder behind its base, especially in the centre, at the interlobular notch, which is readily reached in the natural state of the parts.

Once familiar with the normal conditions thus presented, deviations will easily be recognised; but without such previous knowledge, it is impossible to appreciate any but considerable developments of disease. It is desirable to pursue a methodical plan in conducting these examinations. For example: the first step of the inquiry should have for its object the deviations in size and form. The first-named is almost always in the direction of enlargement. Is it general, or partial? affecting one, or both lobes? and to what extent? Affecting breadth mainly, or forming a rounded protrusion into the bowel? It is so prominent sometimes, that the tip of the finger encounters the swelling the moment it enters the rectum, and has to be depressed considerably before it can be carried beneath the tumid organ. Again, instead of finding the yielding coats of the bladder in the middle line, when the finger is carried up to its fullest extent, an increasing fulness and firmness may be encountered, due to an enlargement or outgrowth from the median portion ('middle lobe') occupying that situation, and defying any attempt to define it. Then the contour of the enlargement may not be uniform or spheroidal; it may be irregular, knobbed, or mammillated, firm, and incompressible; conditions which it is very important to note.

Secondly, the consistence of the parts is to be ascertained. Is the tumour soft, hard, or unequally so in places? Is there fluid in it? And—often a question of vital importance—can we appreciate fluctuation distinctly beyond it? In the latter case, the right hand should be applied to the hypogastric region, and firm pressure made there, with the view of ascertaining if a large body of fluid, such as a distended bladder, can be pressed down upon the apex of the finger, in the rectum below; then gentle but sudden taps should be made on the same region, for the purpose of imparting the wave-like impulse which, under such circumstances, will be communicated. This is an important mode of verifying the condition of the bladder, and the proper position for the trocar, when the operation of puncture by the rectum is about to be performed, or its applicability to the case in question has to be determined. At the same time, the situation of arterial branches is learned; one or two of considerable size may generally be felt a little to the right or left of the middle line, and, sometimes crossing it, branches of the hæmorrhoidal arteries. The presence of prostatic calculi may sometimes be thus ascertained, when large or numerous, lying in one or more cavities of the prostate, with very little tissue intervening between them and the wall of the rectum.[1]

Thirdly, we seek for the degree and locality of tenderness in this region; making firm pressure distinctly with the point of the finger in three different spots;—on the centre of the prostate, on the extreme right and left borders, consecutively, permitting an interval of a few seconds to elapse, that the patient may clearly distinguish each separate movement, the sensation occasioned by which he is required to describe. If inflammation is present, the pain will be extreme, and the mere introduction of the finger will be very distressing to the patient; in this case, heat and tension will be remarked also.

Lastly, supposing a sound or catheter to have been previously introduced, we may, while holding it in the right hand, and communicating to it gentle movements downwards, estimate the thickness of the tissue intervening between it and the finger in the bowel, also the situation and direction of the instrument, &c., in event of there being difficulty in introducing it. Its presence there is occasionally useful, for the purpose of furnishing a solid body of known size and form over which the exploring finger may pass; and by the aid of which most of the above-mentioned inquiries can be prosecuted with facility.

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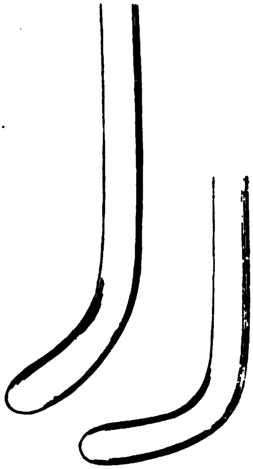
[1] I have more than once had patients with embedded calculi in the prostate. The grating from these is very perceptible to a finger in the rectum, when a catheter lies in the urethra, and is gently pressed downwards. A few months ago I removed several thus felt, of rather large size, by the urethral forceps; and more recently several by opening the sac from the perineum.

Having learned, relative to these different points, all that can be attained through the rectum, the urethra is to be explored. This may be done either with a silver or 'flexible' catheter, the latter being easier for the student, and less irritating for the patient. It should not be small, nor very large; a number 7 or 8 (English scale) French coudée catheter being suitable for most prostatic cases. If the urine flows when the catheter has passed about 6½ to 7½ inches, no considerable hypertrophy can exist; but the converse position is probably present, if the catheter passes 7 to 9 inches before urine appears. If a silver catheter, or a sound, is used, the handle will require to be depressed more than in the healthy subject. In advanced cases the ordinary silver catheter is inadequate to reach the bladder, or does so only when it has passed further than usual, and another instrument may be necessary. This is generally from two to four inches longer, and possesses a larger curve than the ordinary catheter; while some instruments describe also a larger arc, a third, for example, instead of a fourth, of the circle. A medium prostatic silver catheter (see fig. 25, *b*, Chapter XIII.) has its beak at right angles to the shaft, the recollection of which makes the direction and even the exact position of the beak obvious at once to the mind's eye, the axis of the shaft being, as it always is, in view. In some few cases, while the beak passes through the prostatic part of the urethra, the handle will be distinctly deflected to the right or left, from which fact, if verified by two or three trials, a greater degree of enlargement may be suspected to exist on the side from which the handle turns.

At all events, by one or other of these courses we may obtain approximatively correct views of the size and mode of development of the prostatic enlargement. The progress of the complaint may, if desirable, be noted from time to time, but I am not aware that any advantage can be obtained by more exact knowledge respecting it, attainable, perhaps, at the expense of reiterated and painful applications of the instrument.

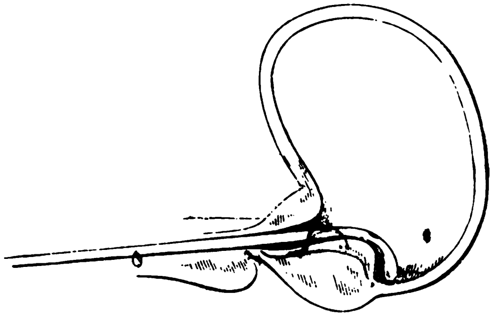
It is necessary, however, to know that it is possible to determine more accurately the condition of the prostate, of the bladder and its contents, especially in relation to the question of calculus or tumour, by other means than those described. For the purpose in question, it is necessary to employ a sound with a very short curve at its extremity, or possessing a beak rather than a curve, which is much shorter and more angular than that of the ordinary catheter. Instruments somewhat resembling this description have long been employed for sounding the bladder, and are especially necessary for examining the condition of the prostate. When the sound has entered the cavity of the bladder, the beak can with care be turned freely in any direction, whet is full or empty. In this manner not only can every part be searched for calculus, but in specting the form and degree c at the neck, whatever may be i also be acquired. After the bladder has thus been traversed, the instrument should be gently withdrawn until the beak lies just within the urethro-vesical orifice, when, by turning it round to the right and left, the natural condition, if it exist, of that part can be ascertained; or, on the other hand, the presence of tumour, or of stone, the depth of the fossa behind the prostate (fig. 20), and other relative points, can be determined. It has been deemed advantageous by some to use a hollow sound, so that the quantity of fluid in the bladder can be augmented or diminished, without removing the instrument; the channel opening about an inch from the end upon the convex surface (see fig. 21). The cylindrical handle which I originally designed for the lithotrite may be also adapted for the sound with advantage (see fig. 22).

FIG. 19.



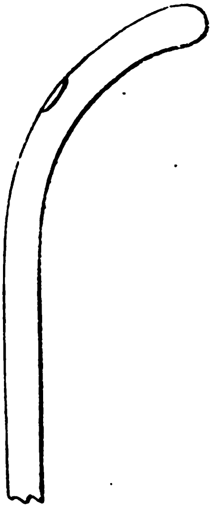
Short-beaked sounds for exploring.

FIG. 20.



Sound in the bladder with the beak turned down behind the enlarged prostate to explore the depression there.

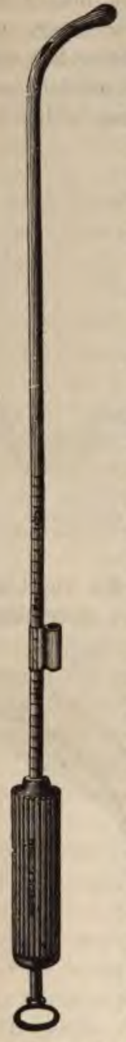
FIG. 21.



A good model for the beak of an exploring sound.

I have never thought it wise to adopt the varied manœuvres for the purpose of arriving at a diagnosis respecting the precise terms of a prostatic enlargement, which some specialists of the French school have been wont to employ; still, it may not be unprofitable to notice briefly the methods by which exact information respecting it is sought. And since I demur to the practical object for which such manœuvres are generally designed, viz., the destruction by mechanical or chemical means of obstructing portions of the prostate, there is additional ground for doubting whether the employment of many of them can conduce to any beneficial result. I shall, therefore, describe only one or two of the simpler means in use for diagnosing prostatic outgrowths and tumours of the neck of the bladder, premising that the instrument employed is always one of the kind above delineated. For the more complicated proceedings of this kind, the reader is referred to the practice and writings of the authors themselves, particularly to those of Mercier.

FIG. 22.



Sound with a cylindrical handle.

1st. Means of recognising tumours which rise into the neck of the bladder.

The sound having been introduced, it is slowly and gently, but completely, rotated on its axis in the cavity of the bladder, and close to its neck. If the prostate is healthy, this is done without any elevation of the instrument, and the shaft retains an almost horizontal position (the patient of course being recumbent). But supposing that there is a tumour at the neck of the bladder, the beak must be arrested in the movement of rotation, and it will be necessary to elevate it in proportion to the height of the eminence, after which it will descend again, the movement of the handle indicating approximatively the size and form of it. If, in introducing the instrument through the prostatic part, the beak is found to rise gradually, the handle being depressed below the horizontal line, there is probably spheroidal enlargement of the median portion. But if the beak abuts upon an obstacle there, and has to be lifted over it in a direction upwards, entering the bladder with somewhat of a jerk, there is probably an enlargement of the same portion, affecting the form of a bar, with a deep sinus of the prostatic part of the urethra. But in this case the instrument can be rotated with facility, which, as has been just seen, cannot be accomplished when it is a case of tumour of the median portion of the prostate, and not a simple bar. In withdrawing the instrument from the bladder, the beak being turned downwards to the bas-fond, if the prostate is healthy, it will come back into the urethra easily, but if there is an enlargement there, it will hook against it, and not leave the bladder in that position.

2nd. In order to recognise an enlargement of the prostate projecting into the urethra, Mercier. proceeds as follows: 'After having explored the bladder, I draw the instrument gently back into the prostatic region of the urethra, pressing lightly upon it, at the root of the penis' (its upper aspect), 'just under the pubic symphysis, so as to press the angle of the sound or salient part of its curve against the posterior wall of the prostatic urethra; then I draw it forward without elevating its shaft towards the abdomen, as in ordinary catheterism, and without making it deviate much from the axis of the patient's body (15° to 25°). When there is a simple enlargement of the prostate in the antero-posterior diameter, the beak traverses it easily without inclining either to the right or left. If, on the contrary, there is a projection of one of the lateral lobes, the beak, in passing the spot, inclines to the opposite side: the handle indicates this movement and the direction in which it is made.'[1]

This portion of the subject may be appropriately closed with a few remarks on the diagnosis of prostatic enlargement as against stricture of the urethra, vesical calculus, tumours of the bladder, simple atony or inertia of the coats of the bladder, and paralysis.

In Stricture of the urethra, the stream of urine is invariably small, in a confirmed case extremely so; in the prostatic affection, though diminished in force, it is often less so in volume than in the previous case. The use of a full-sized sound, however, marks the distinction clearly. In stricture, obstruction is encountered always before six, mostly before five, inches of the instrument have disappeared, always before it arrives at the prostatic urethra. In enlarged prostate, obstruction is not encountered until seven or eight inches have passed, and not necessarily then, for provided that the instrument be sufficiently long, it may pass into the bladder; but the handle, supposing the instrument to be a metallic one, has to be depressed between the patient's legs in a manner not required in the normal state. Lastly, stricture almost invariably makes its appearance before middle life; prostatic hypertrophy never before fifty-four years of age.

In regard to Calculus, while many of the symptoms are common to both complaints, the occurrence of severe pain at the close of micturition referred to the end of the penis; the exacerbation of symptoms, especially of pain and the appearance of a little blood after exercise, may be looked upon as strongly indicating the presence of stone in the bladder. Nevertheless, calculus may exist in the absence of most of these signs, the two first-named especially, from the circumstance that it is sometimes situated behind the enlarged prostate, and does not approach the more sensitive region of the internal meatus. The fact of small quantities of blood being occasionally passed after exercise, more closely approaches in value to a pathognomonic sign than any other. A persistent discharge of slightly bloody mucus, or of pus, in the urine, should also arouse suspicion. The use of the sound, however, can alone clear up this case also satisfactorily.

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[1] *Recherches Anat.*, &c., pp. 364, 365.

In comparing the enlarged prostate of elderly men with defined Tumour of the bladder, the most prominent distinction is the persistent hæmaturia present in, at all events, that class of growths which is most frequently met with, viz., 'Papilloma.' There may be little undue frequency of micturition, and not much pain in the earlier stages of this disease, while the bleeding steadily increases in quantity. Shreds of tissue passed will sooner or later offer indubitable evidence of the presence of papilloma in the bladder, when examined under the microscope. Explorations by sound or by rectum do not necessarily reveal trustworthy signs, although in the later stages the first will experience some obstruction to free movement, and the second will enable the finger to verify some fulness and roundness of contour in the bladder, although soft and yielding under pressure. If carcinoma be present, the hard, incompressible, irregularly formed enlargements of the prostate and base of the bladder are scarcely to be mistaken for any other disease, being totally unlike the physical conditions occasioned by any enlargements of a non-malignant kind.

Simple uncomplicated chronic Cystitis, with catarrh, is by no means a common affection. The series of symptoms thus denoted is almost invariably due to the presence of a foreign body, to some form of obstruction, to atony, or occasionally to paralysis, depriving the patient of the power of expelling the contents of his bladder—conditions which produce effects similar to those caused by obstruction. We may rely upon it that in most of the obscurer cases there is a material cause, not infrequently calculus; the presence of which needs a more than ordinarily searching examination to verify. In very rare cases, it may be encysted, or otherwise rendered difficult of detection by the sound. The absence of all the physical signs of enlarged prostate, by rectal and vesical exploration, will, of course, prove the non-existence of that complaint as a cause.

Single or repeated acts of voluntary over-retention of urine are sometimes followed by Atony or inertia of the muscular parietes of the bladder, and a state of chronic retention follows from their consequent inability to expel the vesical contents. The condition resulting resembles much the retention produced by enlarged prostate, and requires frequent relief by the catheter in the same way, at least for a time. Here the absence of physical signs, the history of the attack, its connection with a cause sometimes recognised by the patient, and the diminished power of discharging the urine, the patient being in the recumbent position, after a catheter has been placed in the bladder, help to distinguish this affection. In enlarged prostate, the urine often flows with considerable force when the influence of the obstruction is removed by the introduction of a catheter, and the current can be accelerated materially by the will of the patient, unless there be atony also, as there may be from undue distension. But when the cause of engorgement and retention is not obstruction, but complete atony of the bladder, the urine runs out of the catheter, and is not propelled, neither can the flow be much influenced, by any efforts of the patient.

Lastly, there is Paralysis of the bladder, a condition in which its nervous supply is either impaired or destroyed. It is mostly associated with some deficiency of nerve-power in the lower extremities, and this may result either from disease or injury affecting the encephalon or spinal cord. There is no evidence of the existence of true paralysis, that is, a removal or impairment of nervous influence, *limited to the bladder*; nevertheless, the term paralysis is constantly applied, but most inappropriately, to denote inability of the viscus to expel its contents, whether the cause be obstruction at the neck, or morbid changes (atony) in its muscular walls. The bladder is not deprived of nervous force, and thus rendered paralytic, except when there is lesion of some nervous centre affecting other organs in a similar manner. Occasionally it is the first incident to be noted in the series of changes denoted as 'Locomotor Ataxy;' but as a rule the bladder is not affected until a late stage in the evolution of that disease. There can then be no doubt respecting its presence; and the indication which catheterism presents, when it does exist, is also singularly characteristic. An instrument being introduced, the urine is propelled by the weight of the parts around, the will of the patient exerting no influence upon its flow unless the abdominal muscles should be in a normal condition, as in cases of injury (rare) occurring to the spinal cord between the sources of nervous supply to those muscles and to the bladder, in which case a slight influence is perceptible. Otherwise no impulse is noticeable, except through the agency of acts unassociated with micturition; such as deep inspiration, coughing, sneezing, and the like, by which a momentary pressure is communicated to the paralysed bladder, and the stream is momentarily accelerated.

CHAPTER XII.

THE TREATMENT OF PROSTATIC ENLARGEMENT, AND OF ITS COMPLICATIONS, IN ELDERLY PATIENTS.

1. TREATMENT for the purpose of obviating the results of Obstruction caused by Enlarged Prostate—Necessity for removing retained Urine—Question of patient relieving himself—Instruments to be used—Precautions against Septic Infection—Of permitting a Catheter to remain in the Bladder—Evil Results of not relieving the Bladder—Treatment of ATONY OF THE BLADDER—Of CHRONIC CYSTITIS—Injections—Counter-irritation—Baths—Buchu—Pareira brava—Uva ursi—Triticum repens—Matico—Alchemilla arvensis—Epigæa repens, and other agents—Copaiba—Cubebs—Benzoin—The Demulcents—Indications for use of the foregoing—The Mineral Acids—Alkalies—Benzoic Acid—IRRITABILITY OF BLADDER—Value of Opiates—HÆMORRHAGE—Its Treatment—INCONTINENCE of Urine—Treatment—Recurring Attacks of Congestion. 2. THE GENERAL TREATMENT and Management of Patients with Enlarged Prostate—Dietetic, Regiminal, and Moral. 3. SPECIAL TREATMENT against Enlargement itself—Hemlock—Mercury—Hydrochlorate of Ammonia—Iodine—Mr. Stafford's Method—Bromine — Kreuznach Waters — Compression — Depression — Electricity—Division and Excision—Crushing, &c.

THE topic presented for consideration in this chapter is one of great interest and importance, and is worthy to be the subject of prolonged and careful study. Its interest for the practical surgeon consists in the fact that, notwithstanding the generally admitted intractability of the complaint, much may be done to palliate its most distressing symptoms, and something, perhaps, to retard its progress; but in addition, there is the knowledge that the attainment of any means capable of arresting that progress, or of curing the disease, would be one of the greatest boons ever bestowed by the science of medicine upon suffering humanity. The importance, therefore, of the subject is equally manifest. No wonder, then, that the search for remedial treatment should constitute an alluring subject of inquiry for students of the healing art; and that much research and experiment have been devoted to this department of pathology.

In considering this subject, it will be found convenient to make three distinct divisions of it, and to regard them separately, as follows:—

1. Treatment for the purpose of obviating the results of obstruction caused by enlarged prostate.

2. The general, or constitutional, treatment and management of patients with enlarged prostate.

3. Treatment directed against the enlargement itself.

First,—Treatment to obviate the results of urinary obstruction caused by an enlarged prostate.

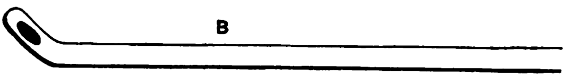
To provide for the removal of retained urine is generally the chief indication presented by a patient so affected, when first applying to his surgeon for advice. Unaware of the nature of his complaint, he seeks to be relieved from some discomfort produced by an obstacle to the free course of urine, such as undue exertion necessary to perform micturition, the unnatural frequency with which the want is experienced, some degree of involuntary micturition, or, perhaps, an alteration of some kind in the character of the urine itself.

The presence of obstruction having been verified by the employment of the catheter and rectal exploration, and the fact being discovered that a certain quantity of urine is habitually retained in the bladder, notwithstanding the patient's efforts to evacuate it, the first principle of treatment is to empty the bladder completely at least once a day. It may be desirable to do this even three or more times daily, the necessity depending, in great measure, upon the amount of urine retained. This portion of urine which remains unvoided by the patient's efforts may be conveniently designated 'the residual urine.' In general terms it may be said that if this residual urine amounts to two or three ounces, the catheter should be employed once a day; if the quantity equals five or six ounces, it should be drawn off at least night and morning. If a much larger quantity of urine is retained than that passed by the natural powers, it is not unlikely that the instrument will be required three times in the twenty-four hours. And if the power of urinating is almost or quite lost, it will be necessary to employ it as often as a decided want to micturate is experienced. There are certain modifying circumstances which must be taken into account. Such are the facilities which exist for passing instruments, and the condition of the urethra itself. If the patient possesses the ability to pass a catheter easily, and it is very rare indeed that he cannot do so after practice, he complies with the demands of his case. But when this ability has not been attained, the difficulty may, in some circumstances, be serious, as when the operation is required to be performed every few hours, and the surgeon is unable always to afford the regular attendance which is desirable. It is, however, generally imprudent to entrust this duty to any non-professional attendant, unless it be to a well-trained nurse; and the patient should be made to understand that, having his own sensations to guide him, he may soon attain considerable dexterity in the management of an instrument, in the one passage with which he will become familiar. But, again, if the urethra and bladder are extremely sensitive, and this condition appears to be aggravated by the very frequent use of the catheter, however gently it is introduced, it will be necessary to make some compromise between the conflicting indications which are thus presented. So, also, the condition of the urine itself, and the amount of mucus with which it is charged, must be taken into account in determining the question: if the secretion is very acrid from decomposition, or much loaded with deposits, more frequent removal is necessary; and an injection of the bladder, as hereafter recommended, may be also desirable. In the majority of cases, however, in which these states are not present, the removal of the urine night and morning suffices to maintain the reservoir in a tolerably sound and healthy condition, and it is undesirable to resort to artificial aid with greater frequency than is necessary to accomplish this object.

With regard to educating a patient to the use of the catheter, it should be done systematically on the part of his medical attendant, as soon as the former has become somewhat familiarised to it by observation. The patient should be taught to note accurately how much of the catheter remains projecting from the urethra and its line of direction with regard to the body, at the moment when the urine flows, so as to accustom his eye to judge correctly as to the point at which he may expect the appearance of a stream when the instrument is in his own hands—a moment always of some anxiety to the inexperienced performer. In using the catheter for himself, he should generally stand with his back against a wall, the receiving vessel being placed conveniently, so that no unnecessary movement of the body be made during any part of the time at which the instrument is within the urethra.

As to the kind of instrument to be recommended, I have seen silver and flexible instruments used with equal facility by different patients, the nature of the case, and the result of trials with both, deciding the question in each particular instance. But it cannot be doubted that in almost all cases a flexible instrument is not only the safest, but the most efficient in the patient's hands. And of all the forms adopted for prostatic patients a catheter the end of which is slightly turned up, or, technically speaking, 'coudée,' '.elbowed' (see fig. 23), is generally the best. The little beak, which, of course, is introduced pointing upwards, keeps close to the roof of the canal all the way, and owing to the flexibility of the entire instrument, which follows the curve of the urethra whatever it is, the extremity slides over any prostatic obstruction with great ease. If more curve is required for any given case, it may be attained by making the instrument with a fixed curve instead of straight, as is usually done, or a second elbow may be made a little higher up towards the stem—the instrument

FIG. 23.

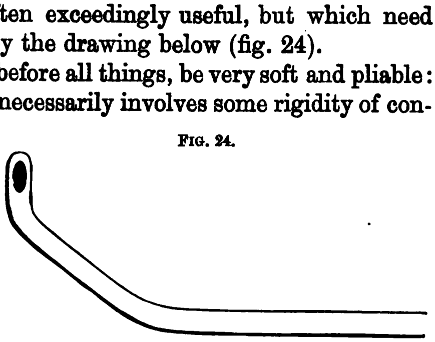


Coudée Catheter.

known as 'bicoudée,' a form often exceedingly useful, but which need not be further described than by the drawing below (fig. 24).

Such an instrument should, before all things, be very soft and pliable: the quality of elasticity, which necessarily involves some rigidity of construction, and is possessed by the English gum instrument, is very undesirable here. The size of the catheter may vary from Nos. 6 to 9 of the English scale; larger are rarely necessary, unless a considerable false passage is present, which is often best avoided by using a large catheter which fills the urethra, and will not enter the devious route.

FIG. 24.



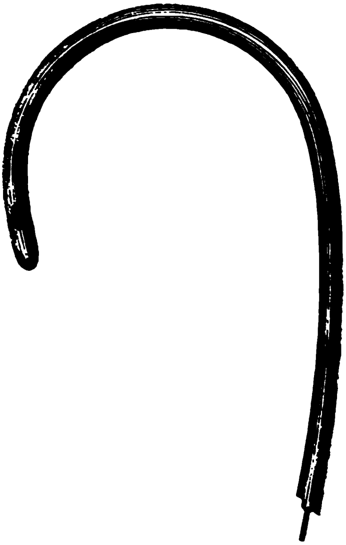
Bicoudée Catheter.

Less valuable, as a general rule, for these cases, is the olivary catheter: the tapering form of its end, often advantageous when any narrowing of the urethra is present, being mostly inexpedient for an enlarged prostate. Moreover, the utility of the olivary form is impaired, or even lost, if the material employed possesses any elasticity or rigidity. The tapering terminal of an olivary instrument should be absolutely pliable, so as to follow a deviation or sinuosity in the canal to be traversed, and then it may be valuable in any case. When rigid, the terminal bulb is liable to injure the canal, rather than to pass through it safely.

The vulcanised indiarubber catheter is a very useful one, and often traverses the urethra more easily than any other. It has the advantage also of being extremely portable, for it occupies less space than any other variety, and may be coiled in any form, treatment which would be fatal to the efficiency of any other instrument. But its extreme flexibility prevents the patient from profiting by its use, when pressure of the lateral lobes of the prostate, or undue narrowing of the urethra, forbid the entry of an instrument which cannot be impelled in its course by some pressure through its extent by the hand. A very small degree of 'friction' between the instrument and the walls of the canal arrests the movement of the vulcanised catheter. In order to reduce this friction to a minimum, a catheter should be employed of small size, say No. 6 or 7, and the surface should be as highly polished as possible. Such an one will often pass where the ordinary vulcanised catheter of the shops—and this is generally No. 10, 11, or even 12 in size—has failed. It should also be borne in mind that, in daily use, the vulcanised catheter is apt gradually to increase in size as well as lose its polish, and thus to become disqualified for service. The best method for the patient to adopt in passing it, is to push in not more than three-quarters of an inch at a time, with a quick movement r than by slow pressure. After about five or six inches have been introduced, the catheter should be held in place for about ten seconds after each push, to give time for the instrument to worm its way; in default of which sustained pressure it is apt to spring out again, and thus to make no progress.

But instruments which are elastic, and not very flexible, have also their own peculiar advantages. The type of this material is the English gum catheter. It is mounted on a wire stilet, and may be used with or without it, according to circumstances: with the stilet, when firmness and immobility are desired; without it, when any peculiar curve and, at the same time, a certain flexibility are required in combination. When no stilet is present, the surgeon may impart to the catheter almost any amount of curve, by giving it the required form in hot water, and then plunging it at once into cold, when the form becomes fixed, at least for a considerable time. They are sold partially curved by the makers, but when required to be more so, they should be kept mounted for a few weeks on overcurved stilets (see fig. 25), so that, when required for use, they may retain a large degree of curve even after these are withdrawn. When there is an elevation of the entrance to the bladder, produced by advanced prostatic enlargement, such an instrument, being at once flexible and strongly curved, sometimes passes with admirable ease where no other will.

FIG. 25.



Elastic gum catheter mounted on an overcurved stilet.

If a metallic instrument must be used by the patient, the mode of employing it is that which is followed by the surgeon himself, and must be taught by him. The patient possesses a certain slight advantage over his attendant in one respect, which compensates for the want of that varied experience, which is the special appanage of the professional man. It consists in his being able to regulate the movements of his instrument, not only by the sense of touch in common with any other operator, but by his consciousness of the sensations produced by it in the urethra, which the surgeon cannot possess. On this ground it is undoubtedly true that, after practice, the patient can often pass a catheter in the most perfect manner, provided that his senses are acute, and that he possesses ordinary intelligence. Accustomed to follow but one track, he knows intimately every portion, and learns some little manœuvre adapted to meet any difficulty which may be presented.

There is an important subject connected with the use of the catheter, which may be appropriately considered here. It is the necessity for scrupulous attention, whether by the surgeon or by the patient, to absolute cleanliness in all that pertains to the introduction of instruments into the bladder, whether for withdrawing urine, injecting solutions, or sounding the cavity. All that is necessary in relation to instruments, whether they are metallic or flexible, is that they are clean and disinfected at the time they are used; that they should be anointed with a lubricating material mixed with a disinfecting agent, and that some of this agent should form part of all solutions employed as injections into the cavity of the bladder.

For all purposes I know nothing better than carbolic acid. It has been said to irritate the bladder; it does so only when used in too great quantity. One part in fifteen hundred or two thousand—in simpler and more practical terms, one minim in four ounces of water—is sufficiently strong ($\frac{1}{1920}$) for all purposes in the cavity of the bladder, and should in that proportion be added to solutions of lead, silver, matico, &c. Boracic acid is very irritating to the bladder if the solution is not a mild one. A solution of three to five grains to the ounce suffices for all purposes. No better lubricator can be desired than olive oil containing eight per cent. of carbolic acid, well mixed.

A good deal of unnecessary fear has been entertained of the danger of air entering the bladder, in relation to the introduction of germs; and special apparatus have been designed to prevent it. I have very rarely known the entry of air into the bladder, and I have observed it very frequently—as an occurrence due to the employment of imperfect apparatus for making injections, or from a faulty method of employing the best—to originate bacteria in the urine, readily as this accident happens from using an impure instrument. That the event might also occur from introduced air is easily conceivable; but as a matter of fact it very rarely does take place.

But in the performance of simple catheterism, and in injecting the bladder, when ordinary care is employed, there is no fear whatever of introducing air into the bladder. The contracting power of the bladder when a catheter is in it, in addition to the pressure exercised by the abdominal contents and the tension of the abdominal walls, combine to maintain a constant current outwards through the catheter, which is thus kept always absolutely full of liquid, urine, or injected fluid, as the case may be. The external atmospheric pressure invariably acts on the fluid as on that in the barometer, with this result—that no air can possibly enter. Force equal to the overcoming of the vesical and abdominal pressures, can alone introduce air in the bladder.

In cases where there is vesico-intestinal fistula, gas is forced by the intestine into the bladder, but in these cases no septic injury whatever is done by it. The chief care in these cases is to guard against the entry of solid matters, not of gaseous. I only desire to point out that, while we should be careful to exclude air in our manipulations, since it is to some extent an irritant, no elaborate contrivances are necessary to prevent its entry, and that its presence in the bladder is not really a matter of such great importance as some persons imagine it to be.

There is one rule which patients who rely solely on an instrument for the act of micturition, should invariably provide for. It seems a natural and simple inference from their condition which could not be overlooked, that such a patient should be provided with several instruments, and with a choice of two or three varieties. Nevertheless it is so sometimes, and much suffering and even danger sometimes occurs through neglect of these precautions. He should have specially convenient arrangements to carry a catheter, so that he may never be unprovided, whatever his locality or occupation may chance at any time to be. It is very easy to place one, which requires to be kept straight, in such a pocket as a carpenter has for his rule; or to find room for it in a hollow walking stick, or the like. An instrument which requires to be slightly curved, may be safely carried in a hat. If a vulcanised catheter suffices, it may be placed anywhere. But in travelling, especially, an instrument or two of the leading kinds should be carried in some accessible spot, so as to render the patient safe from surprise. Such terrible consequences result from neglect of these precautions, that their mention is not less necessary than any other part of the details of treatment.

It has been recommended by some, as a mode of treatment for enlarged prostate, that a catheter should be permitted to remain in the bladder for several days at a time. There are two hypotheses on which the advice is given. The first is, that by permitting the bladder to remain empty, or nearly so, during a considerable period, the organ may be enabled to regain its contractility, assumed to be lost or impaired by overstretching. Atony is, however, very rarely the essential condition which causes retention in these cases. No doubt it affects to some extent the vesical coats, but it is not the chief agent in the great majority of cases. The material obstruction at the neck caused by the enlarged prostate, and not by any 'local paralysis,' as it is commonly termed, is the sole, or almost sole, occasion of the urinary difficulty; as has been explained in the previous chapter. Consequently, the inlying catheter can avail nothing, and on this ground the practice referred to gains little support.

The second hypothesis is, that the constant pressure of the catheter promotes absorption of the substance of the tumour, and so tends to the material improvement of the patient's condition. But the fact is, that the tendency is much more to ulceration of the tissues than absorption, after the manner supposed. It will, of course, be understood that there is no reference here to cases in which urgent urinary retention has existed, which has been relieved with difficulty by the catheter, or to those in which great pain is produced, or unusual obstacles are encountered in passing the instrument. In such circumstances, as we shall see when discussing that subject in the following chapter, we may be justified in permitting the catheter to remain in the canal for a considerable period.

The consequences of enlarged prostate already alluded to, viz., the increasing retention of urine and habitual distension of the bladder, which accrue from not completely emptying it daily, form only a portion, although a very important one, of the evils which can be obviated by this treatment. Associated with these, and entailed by the same cause, is that state of engorgement and overflow of urine, commonly termed, but inaptly, incontinence, which will assuredly follow gradually increasing retention, when unrelieved—a state which necessarily exerts an injurious influence upon the ureters and kidneys, ultimately leading to their disorganisation, and thus to a fatal termination. Short of these results are the scarcely minor ones of atony of the muscular coats of the bladder, chronic cystitis, catarrh, decomposed urine, hæmaturia, calculous deposit, and, always accompanying them, impaired general health. All these can be, under ordinary conditions, avoided, and in others mitigated, by the continuous use of the catheter. It is impossible to overrate the benefits arising to the patient from this means; and the responsibility which is incurred by overlooking or failing to impress his mind with the necessity which generally exists for the use of the catheter, should not be forgotten by the surgeon in dealing with any signs of irritability of bladder, and incompetence to retain urine by persons in advanced years.

Let us suppose, however, that the surgeon is called for the first time to a case in which, from neglect or oversight, the urine has been long permitted to accumulate, so that the amount of residual urine has reached a pint, or even two; and there are, indeed, instances of double that quantity, and more. If he evacuates the bladder two or three times daily, great relief will undoubtedly be at once afforded to the patient; his frequent calls to pass water, the constant dribbling from a distended bladder, should it have been present, will be removed, but the sudden change made by catheterism may, in some few instances, act prejudicially on the constitution.

When the bladder has for a long period of time been overdistended —the patient's condition having been overlooked for months, or even for years, in consequence perhaps of catheterism having been forbidden by some well-meaning but mistaken adviser—it is undoubtedly a serious matter to resort to it. Rashly undertaken, great as is the relief at first experienced, symptoms of fever—'urinary fever,' as it is, I think, properly termed—often appear in a few days; cystitis occurs, catheterism is required more frequently, the urine becomes purulent, the vital power feeble, the tongue dry, nourishment is refused, and the patient sinks—usually in about three or four weeks from the first employment of the instrument. If an autopsy is made, almost invariably the ureters will be found dilated on one or both sides; one of the kidneys diminished in bulk and wasted, the other enlarged, inflamed, and perhaps the seat of numerous deposits of pus. Sir B. Brodie was the first, I believe, to point out the consequence of such treatment in these cases,[1] and observation has demonstrated to me the justice and the value of his remarks.

Following a general law which forbids the making of rapid or extreme changes in the conditions and habits of the human economy (familiarly exemplified by the dangers known to accrue from sudden exposure to heat after extreme cold, or from appeasing, without stint, the cravings of the almost starved), the surgeon should commence his treatment by removing only a portion of the retained urine, not exceeding half the contents of the bladder, and in the course of a week or ten days, perhaps, by gradually withdrawing a somewhat larger proportion, and slowly accustoming the atonied coats of the viscus to their new condition, he may venture to empty it entirely. It is worth observing that the act of emptying the bladder completely in these cases usually produces considerable pain; and this is an additional indication that for some few days after commencing the employment of the instrument a portion of urine should be left in the bladder every time the catheter is used. And if, in the course of the process, the urine becomes very cloudy, as it often does, the surgeon should not hasten to wash out and thus disturb the tender and irritable organ. More harm than good is often done by undue mechanical interference with the washing bottle and injections in these particular conditions. Subsequently, when the first stage has been passed, and any fever which may have arisen has completely subsided, some mild antiseptic injecting of the bladder may be useful. In directing all this part of the treatment the surgeon must exercise caution; meantime endeavouring to invigorate the patient, by improving his digestive organs, and by administering such nutritious food as he can digest, with as much tonic and stimulant as he may require.

Under the circumstances above described the best chance of ensuring a successful issue is to confine the patient to the house, and indeed to advise his maintaining the recumbent position in a warm and equable temperature, usually in his bedroom, in order that the skin may act freely, and that no exposure to cold or movement may be possible. I can scarcely overestimate the value of these precautions, nor advise too strongly the abstinence from exercise and exposure of all kinds for a few weeks in these particular cases. We may thus sometimes succeed in prolonging life, even at a very advanced term, and at the same time avoid the groundless but injurious opposition which is often manifested to the use of the catheter; the want of which at an early period in the patient's history, and not the late recourse to it, has been the real cause of failure in almost all the cases of death attributed to the use of an instrument.

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[1] *Lecture on the Urinary Organs*, 4th ed. pp. 203–5.

This strict regimen is applicable of course only in cases where the residual urine is unusually large in quantity, and is unnecessary in those common examples where eight to ten ounces only remain after an act of micturition.

In the management of cases of enlarged prostate, there are several complications liable to be encountered at some time or another. These it will be convenient to consider separately.

1. **Atony of the Muscular Coat of the Bladder.**—The bladder having for a long period of time been unable to empty itself, the muscular fibres sometimes lose the power of perfectly contracting, even where the cavity is artificially emptied.

When the failure to empty the bladder is due to simple atony, and the difficulty is one of recent occurrence, partial, if not complete, recovery sometimes ensues, if the bladder is regularly emptied once or twice a day for a few weeks. But this does not always happen, and then, partly from disuse and overdistension, and partly from inflammatory deposits in the vesical coats impairing their contractility, the organ still continues in a state of atony.

If catheterism fails to restore the power, the prognosis is not very hopeful. Other means, however, should be tried to resuscitate vesical contractility. Cold affusion or douche suddenly made on the abdomen may be applied twice a day. Cold water injections into the bladder itself are sometimes of service, and may be employed on alternate days, and afterwards every day. These failing, a current of electricity may be passed by applying one pole to the lumbar region of the spinal column, and the other to the perineum and hypogastric regions alternately. Or a mild current may be passed, by applying the latter pole through the urethra to the interior of the bladder. It is not common, however, to meet with cases in which these proceedings are successful.

The constitutional remedies are strychnia, in moderate doses, such as the $\frac{1}{20}$ or $\frac{1}{16}$ of a grain two or three times daily, but employed for a long period of time; tincture of steel, and ergot of rye: all combined with tonic regimen.

2. **Chronic Cystitis**—a consequence of prostatic obstruction—is generally encountered at some time or other in most cases. Its

presence is manifested by the appearance to the naked eye of pus and mucus in the urine, by undue frequency of micturition, and dull pain in the region above the pubes. It is generally very amenable to treatment, and often disappears under the habitual use of the catheter above described. But when this is not the case, if the symptoms are not severe, and the discharge of viscid mucus which accompanies it is not mixed with blood, much benefit may be obtained by simply washing out the bladder once a day with warm water or, better still, with a mild antiseptic solution, say of boracic acid, or of the boroglyceride. This should be done with small quantities of fluid successively injected and expelled, through a small soft catheter, and never by means of a double current catheter, which in all circumstances is liable to produce more irritation than the simple instrument, and offers no special advantage over others. After the mucus and purulent matter have been removed, which may be assumed to be the case when the water flows clear and untinged from the cavity, decided benefit is in some cases obtained by using mild astringent injections, at intervals of two or three days—always commencing with extremely weak solutions —whether of the acetate of lead, or the nitrate of silver. This treatment will be further considered hereafter (see page 139).

Depletion of any kind is never admissible. Counter-irritation is not very efficient or easily applied, and often occasions much discomfort. Blisters, lunar caustic, and iodine have been thus employed for the suprapubic region. But nothing is so useful as a hot linseed poultice, the surface of which has been sprinkled with flour of mustard, applied there; and this may be regularly repeated every day, or every other day, for some time with advantage.

Hot hip-baths, by which is intended a temperature ranging from 100° to 108°, or even higher, according to the patient's ability, natural or acquired, to sustain it, are among the most useful means. The patient should remain in the bath about ten or twelve minutes, the object being to make a smart impression on the skin, and fill its vessels, and not to weaken or sweat him unnecessarily. When removed, he should be rapidly dried, wrapped in hot flannels, and placed in bed, or in a recumbent position.

The hot bidet, or basin of hot water, is in some circumstances as useful, inasmuch as the application can be used at a higher temperature than the preceding, since the heat is confined to a much more limited surface. Besides, the bidet does not induce weakness by repeated use, as hip-baths are liable to do.

Respecting the internal administration of medicines there is some difference of opinion, at least as to those which possess the most value in chronic cystitis. A short notice will be devoted to each principal agent, so that the special indications which should determine the selection for any particular case may be inferred.

The infusion of Buchu[1] is regarded as d when active
tonic;' its activity in regard of its action or the mucous
due to a volatile oil, which communicates it h the leaf
one to two or three ounces may be given fr mes in
twenty-four hours; and it may be strength y be
thirty to sixty minims of the tincture. It
irritable bladder, arising from stricture ar
is diuretic, but seems to exert a benefi
membrane of the bladder, and to lessen m
disagrees with the stomachs of a few pati
than useless to administer it. In consequence of the varied op-
which are expressed respecting the relative value and properties of these several agents by different authorities, I shall cite several of them in notes at the foot of the page, to present at one view the collective experience of those who should be among the best able to judge of this subject.

The decoction of Pareira brava[2] is largely prescribed in this presence is efly on account of the strong commendation it formerly mucus i rom Sir B. Brodie. He advised that it should be made in a in the oncentrated form, and given in larger quantities than those me rerly employed. The dose of decoction should be from two to four ances three or four times in the day. It may be rendered more powerful by adding one or two drachms of the liquid extract to each dose of the decoction. (The indication for its use is not simple irritability of the bladder, so much as the presence of viscid mucus in large quantity.)

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[1] Buchu.—The leaves of the Barosma crenata and others; a rutaceous plant, from the Cape of Good Hope, introduced into practice in this country, about seventy years ago, by Dr. Reece.

Dr. Prout says: 'In chronic affections of the mucous membranes of the urinary organs, . . . among remedies of the balsamic class, the mildest, as well as one of the most efficient, is the buchu.'—*Stomach and Renal Diseases*, 4th ed. 1848, p. 403.

Mr. Wm. Coulson writes: 'In my experience, however, no medicine has been so generally successful in irritability of the bladder as the infusion of buchu. I could cite several cases where it has succeeded after other medicines had failed.'—*Diseases of the Bladder*, 5th ed. 1857, p. 85.

Sir B. Brodie believes the use of buchu to be mainly limited to that class of cases in which the bladder affection does not depend on obstruction at the outlet, but on renal disease, and states: 'In these I cannot doubt that I have seen it productive of the most beneficial effects.' He advises its continued use for a long period, if tried at all, and in doses of one and a half to two ounces three times a day.—*Lectures*, 4th ed. p. 151.

Dr. Gross thinks 'its use is occasionally attended with benefit, but has never derived much advantage from it.'—*Anatomy and Diseases of the Urinary Organs*, 2nd ed. p. 228.

Dr. Pereira says: 'In chronic inflammation of the mucous membrane of the bladder, attended with copious discharge of mucus, it frequently checks secretion, and diminishes the irritable condition of the bladder, thereby enabling the patient to retain his urine for a long period; but I have several times seen it fail to relieve, and in some cases it appeared rather to add to the patient's sufferings.'—*Elements of Mat. Med.*, 3rd ed. 1853, p. 1913.

[2] Pareira brava.—The root of this plant has been prized by different nations for some centuries as an antidote to calculous disorders.

Sir B. Brodie says: 'I am satisfied that it has a great influence over the disease (chronic cystitis) which is now under our consideration, lessening very materially the secretion of the ropy mucus, which is in itself a very great evil, and, I believe, diminishing the inflammation in the bladder also.'—*Lectures on the Urinary Organs*, 4th ed. p. 112.

The decoction of Uva ursi[1] has also obtained a reputation for checking muco-purulent discharge from the bladder, which is caused

Dr. Prout states: 'Of the remedies of a tonic and astringent character, the Pareira brava is undoubtedly one of the best we possess in catarrhal affections of the bladder.'—*Op. cit.* p. 403.

Mr. Wm. Coulson speaks of it as adapted to irritability of the bladder associated with pain, for which he regards it as 'an excellent medicine,' adding that 'it may be combined with nitric or nitro-muriatic acid, or dilute phosphoric acid to lessen the secretion of mucus.'—*Op. cit.* p. 173.

Dr. Gross has never seen any good effect result from its use.—*Op. cit.* p. 227.

[1] ARCTOSTAPHYLOS UVA URSI.—An ericaceous plant, the leaves of which have long been employed against calculous diseases.

Dr. Prout writes: 'When the kidneys and bladder are more than usually irritable (in the early stages of organic renal disease), . . . I doubt if any remedy surpasses the Uva ursi when judiciously directed.'—*Op. cit.* p. 159. Again: 'In chronic affections of the mucous membranes of the urinary organs, . . . next to the Pareira brava rank the Uva ursi and the Lythrum Salicaria. These last are, however, more especially beneficial to those forms and stages of the affection marked by irritative excitement, rather than by vascular activity, or by organic disease.'—P. 403.

Sir B. Brodie says: 'The Uva ursi has the reputation of being useful as a remedy for chronic inflammation of the bladder. I must say, however, that this remedy has generally disappointed me in these cases, and that I have not seen those advantages produced by it which the general reputation of the medicine had led me to expect.'—*Op. cit.* p. 112. Again, in cystitis, depending on renal disease, he states that 'it may, in some instances, be employed with much advantage.'—P. 150. But fuller doses than usual are advised.

Mr. Wm. Coulson speaks well of it, but thinks more highly of buchu.—*Op. cit.* p. 96.

Dr. Gross says: 'I have used it a good deal in the treatment of cystirrhœa, and have occasionally experienced the best effects from it. (I have found it particularly serviceable in cases attended with excessive morbid sensibility of the neck of the bladder.'—*Op. cit.* p. 228.)

Dr. Pereira writes: 'My own experience of it amounts to this, that in some cases the relief obtained by the use of it was marked, whereas in other instances it was of no avail.'—*Op. cit.* p. 1544.

Dr. Wood, of Philadelphia, believes 'the credit which it now enjoys is scarcely equal to its merits,' and adds that, 'in cases of cystirrhœa, persevered in for a long time continuously, for several months if necessary, I believe that it will occasionally effect cures even unaided, and will often prove a serviceable adjunct to other measures.'—*Treatise on Therapeutics*, vol. i. pp. 129, 130. Phil. 1856.

by decomposing urine. It is said to be contra-indicated when active inflammation is present, having an astringent action on the mucous membrane from the amount of tannic and gallic acid which the leaf contains. The dose is from two to three ounces three or four times in the twenty-four hours. Ten or twenty grains of the extract may be added to each dose of the decoction.

An infusion of the underground stem of the Triticum repens (dog's grass, or couch grass[1]) is an agent I have found useful in cases of constant and severe irritation of the bladder from any cause. It has long been prized in these circumstances in some country districts; and it is officinal as a diuretic, and as an emulcent among the French. My first knowledge of it was derived from a country patient with severe stricture; the frequent and painful micturition from which he suffered being more effectually subdued by this remedy than by any medicinal means I could devise. My opinion is, that it is of more value in stricture and calculus than in prostatic irritation. Nevertheless, in this condition also, where the indications are to lessen the frequency and the pain of micturition, it may be useful; sometimes affording relief when buchu, pareira, uva ursi, and other infusions, have failed. The mode of administering it is the following. About three ounces of the dried underground stem, popularly called root, are slowly boiled in two pints of water until reduced to one pint, the liquid is strained and taken when cool; a third part three times in twenty-four hours. Like other agents, it should be taken alone, with the view of observing its effects, although it may also form a vehicle either for acids or for alkalies, when desired. It is somewhat diuretic, and perhaps slightly aperient.

A decoction of the Lythrum Salicaria was employed by the late Dr. Prout, and considered by him to be very nearly allied in its properties to the Uva ursi (see note on p. 130). It was formerly officinal in the Dublin Pharmacopœia. The dose is from two to three ounces.[2]

The Alchemilla arvensis was also recommended by Dr. Prout when the urine is alkaline and phosphatic, in which circumstances, he says, 'a strong infusion, taken frequently, sometimes gives great relief.'[3]

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[1] TRITICUM REPENS.—James, in his *Medicinal Dictionary* (Lond., 1743), thus speaks of it: 'The decoction of the root drank is effectual against the gripes, difficulty of urine, and ulcers of the bladder, and breaks the stone. *Vide* Dioscorides, 1, 4, c. 30. It is also moderately aperient and lenifying.' The lithontriptic virtue of this plant has also been taken notice of by Boerhaave, and confirmed by abundance of experiments. John Gerard, in his famous *Herball* (Lond., 1623), speaks of it in similar terms. Among the ancient authors it enjoyed a great reputation; Paulus Ægineta names it more frequently than any other remedy in urinary diseases.

[2] Lythrum Salicaria, the spiked purple Loosestrife. It has been employed chiefly in diarrhœa and dysentery, being mucilaginous and astringent. For the decoction, one ounce of the root is boiled in one pint of water.

[3] Alchemilla arvensis: an indigenous plant. It is astringent, and has had an

The solvent power for phosphatic deposits, for which this plant has enjoyed a credit, was believed by Dr. Prout to be due to the malic acid which it contains. I have largely employed it during the last fifteen years, and regard it as one of the best agents we possess in dealing with doubtful or obscure cases of chronic cystitis, and chronic calculous pyelitis. But in all forms of disease producing frequent and painful micturition, it demands an early trial. It never disagrees with the stomach, and is not unpleasant to the palate. The formula is as follows: Infuse one ounce of the herb in one pint of boiling water for an hour; strain, and take three or four ounces of the liquor three or four times daily.

Another remedy is the Achillea Millefolium (common Milfoil): an infusion is made of the same strength as the foregoing, and the dose is the same. It is certainly inferior to the preceding remedy.

Matico,[1] well known as a powerful astringent, appears to have been advantageously employed in cystitis accompanying prostatic enlargement. Dr. Neligan says, 'I have found the tincture very useful in the treatment of catarrh of the bladder in the aged.'[2] The infusion is given either with or without the tincture, in doses of from one to two ounces. It possesses a volatile principle, which appears to resemble that of cubebs, and to have a similar action.

The decoction of Senega is said to check undue mucous secretion from the bladder, doubtless from its reputation for controlling the bronchial catarrh of elderly people. The dose is two ounces, two or three times a day.

Dr. Gross quotes cases illustrating the value of the Epigæa repens,[3] in chronic cystitis with catarrh. It is administered in the form of decoction, the dose being two ounces, frequently repeated. Somewhat related to the Uva ursi, but possessing less claim to utility in the complaint just named, is the Chimaphila, or winter-green. It has been employed in the form of decoction, in two or three ounce doses, which

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ancient popular reputation for the cure of gravel and calculus.—*The Nature and Treatment of Diabetes*, 2nd ed. p. 185.

[1] Matico belongs to the natural order Piperaceæ, from which are obtained the cubebs and other peppers. The infusion, which is generally prescribed, is prepared with an ounce of matico to a pint of boiling water.

[2] *Medicines, their Uses and Modes of Administration*, 4th ed. p. 76. Dublin, 1854.

[3] *Op. cit.* 2nd ed. p. 228. Epigæa repens, the Trailing Arbutus—diuretic and astringent. The decoction is made with one ounce of the dried leaves boiled in a pint of water. This plant appears to be nearly related to the Uva ursi. Another American remedy is the Phytolacca decandra, or Virginian Pokeberry, employed in order to alleviate simple irritability of the bladder. Dr. Gross says: 'Dr. Physick was in the habit of prescribing, with decided success in this affection, the saturated tincture of Pokeberries. He gave it in two-drachm doses, every seven or eight hours.'—*Op. cit.* p. 262.

may be strengthened, when necessary, by the addition of extract.[1] The infusion of wild carrot seeds[2] has been regarded as exercising a sedative influence in some irritable conditions of the bladder. It has been chiefly used in relieving the strangury occasioned by blisters.

All the foregoing act probably, to some extent, by means of their diuretic properties; inducing a flow of watery urine, and so diluting irritating matters which may be present; while the astringent action of some may influence the mucous membrane, and diminish its secretion. In some, of which the buchu is the most marked example, the volatile oil contained may, besides acting as a diuretic, exert some influence, so-called specific, upon the vesical mucous coat, of a calmative kind, when it is the subject of chronic inflammation with catarrh. That this is probable appears indicated by the known effect of some of the balsams, for example, the value of small doses of copaiba in chronic catarrh of the bladder. If beneficial generally, the result is soon apparent; there is therefore nothing gained by employing increased doses or prolonged use of the remedy. Indeed any increase of the dose beyond 7 or 8 minims appears to diminish the beneficial effect. It may be given with 20 or 30 minims of liquor potassæ, the taste being well disguised by an ample addition of compound tincture of lavender, and syrup of tolu. But most patients probably prefer it in the popular form of capsule.

The Chios turpentine was long ago recommended, in doses of 4 or 5 grains, by Sir Benjamin Brodie. Both this and small doses of Cubebs pepper, 10 to 20 grains, have been found useful in checking inordinate catarrh. The volatile oil may be substituted for the powder if preferred, in doses of 10 minims, on sugar or in mucilage; or, better still, the preparations known as 'liquor cubebæ,' in many forms, simple and compound, which are more manageable and efficient. Another balsamic remedy has been recommended, viz., the compound tincture of benzoin in drachm doses three times a day.

Another class of useful agents is the Demulcents. These are, for the most part, simply mucilaginous or starchy solutions, which form an agreeable means of diluting the urine, and in some instances, perhaps, some special therapeutic influence. They are, therefore, often useful vehicles for the administration of the acids and the alkalies, when these are required; but although originally given on account of certain soothing and sheathing qualities to the urinary tract, which, by virtue of their mucilaginous character, they were supposed to possess, there is no ground whatever for attributing their beneficial influence to that quality, which must necessarily disappear in the process of digestion.

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[1] Chimaphila umbellata has long enjoyed a considerable reputation in America, both in urinary complaints and in scrofula, for which latter it has been considered a specific. It is diuretic and astringent. For the decoction, boil one ounce in a pint and a half of water to one pint, and strain.—*L. Ph.*

[2] Daucus Carota, common or Wild Carrot. An ounce of the seeds to a pint of boiling water are the quantities for infusion. Dose, two or three ounces every two or three hours.

Among the most useful are the decoction of marsh mallow, or, in its absence, of the common mallow; the decoction of carageen, or Irish moss; the infusion of linseed; the decoction of barley, better known as barley-water; and a solution of gum arabic in water.[1] An American remedy, which has obtained some reputation, is the inner bark of the slippery elm, Ulmus fulva. It has demulcent properties, and tannic acid, in small quantity, is also present. The following is the formula employed. Macerate one ounce and a half of the bark in one pint of boiling water for six hours; press thoroughly and strain.

In regard to the efficiency of each one of the principal medicinal agents enumerated, it should be remarked that widely differing opinions respecting them are held by experienced surgeons. It is probable that either the virtues of these agents have been overrated by hasty generalisation from a few exceptional cases—or that the particular indications for the use of each remedy have not been accurately defined; so that better results may probably be obtained by more skilful adaptation.

The latter view is not without foundation, since the three chief and most popular remedies in urinary difficulties are mostly prescribed empirically, in turn, and not on any recognised principle. Hence they are frequently employed in combination, a method which is more popular abroad than in this country. The following formula may be regarded as an example.

℞ Fol. Uvæ ursi,
Rad. Pareiræ bravæ contritæ, āā ℥ij.

Boil together in three pints of water until reduced to two, and strain. Three ounces to be taken from three to five times daily. To this, when cold, tincture of buchu may be added, if desired.[2]

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[1] As good formulæ for these simple yet useful vehicles are often wanted, I subjoin a list of those which, having been frequently employed, can be depended upon.

DECOCTION OF MARSH MALLOWS.—Boil three ounces in three pints of water until reduced to two pints.

DECOCTION OF IRISH MOSS.—Clean and wash an ounce of the moss, afterwards boil in a pint and a half of water until it is reduced to one pint. Any proportion of the water may be replaced by milk when required to be more nutritious.

DECOCTION OF LINSEED.—Boil an ounce of unbruised seed in a quart of water for an hour.

DECOCTION OF BARLEY.—Boil two ounces in a pint of water for five minutes, and throw away the liquor. Add two quarts of water to the barley, and reduce by boiling to one quart.

GUM WATER.—One ounce of pure gum dissolved in one pint of water.

[2] A further illustration of this is given by Dr. Gross:—'A combination of some of the articles above mentioned may often be advantageously employed. Indeed,

The indications, then, which I believe will best guide us in the selection of the principal remedial agents enumerated, may be briefly pointed out as follows:—

Chronic mucous discharge from the bladder in large quantity, associated with relaxation and debility, no inflammation being present, may be acted upon by the Uva ursi, by Alchemilla, and also by Pareira. Chimaphila is said to be equally appropriate in this form of complaint.

In simple irritability of the bladder—that is, when the desire to make water is frequent—in the absence of the causes or symptoms of any acute inflammation, the Triticum repens, Buchu, Alchemilla, and perhaps Uva ursi, afford the best chance of relief; but the first named is useful in inflammatory states also.

When there is some chronic inflammation present (not acute), as evidenced by irritability of bladder, some little pain above the pubes, and considerable tenderness experienced when a catheter is passed, certain kinds of volatile oil, which are excreted by the kidney and impregnate the urine, are frequently beneficial. One of the mildest, safest, and most easily digested forms is that found in the infusion of buchu. It may be used alone, or with the addition of 20 minims of tincture or liquor of cubebs, or this may be replaced by a few minims of turpentine or copaiba, but these are more prone to disagree with the stomach; yet they sometimes exercise a beneficial influence when simple buchu has failed, more especially in cases where much catarrh is present also.

In this place may be mentioned a combination, recommended by Dr. Gross, useful in irritable, and even in some inflammatory states of the bladder. One ounce and a half of the leaves of Uva ursi, and half an ounce of hops, infused in two pints of boiling water in a closely covered vessel for two hours: a wine-glass of the liquor to be taken several times a day. Dr. Gross writes—it 'often acts like a charm; promptly allaying the pain and spasm at the neck of the bladder, and powerfully promoting resolution.'[1]

An important point in the employment of the decoctions and infusions in question is to give them liberally. The ordinary doses by tablespoons are, I think, almost valueless. From ten to fifteen ounces

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the effect is usually much more conspicuous when they are given in this manner than when they are used separately. I have long been in the habit of administering, with the happiest effect, a combination of buchu, uva ursi, and cubebs, sometimes in the form of an infusion, but more generally in that of a tincture, given several times a day, in conjunction with a small quantity of bicarbonate of soda. Occasionally a few drops of the balsam of copaiba, the muriated tincture of iron, or dilute nitric acid, may be advantageously added to each dose of these medicines.' He adds, naturally enough: 'When thus combined, it is of course impossible to determine what merit is due to each respective article.'—*Op. cit.* p. 229.

[1] *Op. cit.* p. 186.

must be given daily in order to obtain benefit in most cases. Formerly they appear to have been so administered.[1]

But further, it is to be observed that these infusions and decoctions have been generally administered in combination with other agents, and with the use of other means, which have, perhaps, helped to produce a favourable result, although they have not been permitted to share the credit. The agents referred to are the acids and the alkalies. It has been by no means common to prescribe the vegetable solutions in question unmixed with one of the two classes of remedies just named; and much observation of the simple solutions will be necessary before their specific properties are accurately known. The influence of the acids and alkalies in chronic cystitis may next be considered.

The mineral acids are very frequently ordered simply because the urine is alkaline, and has a tendency to deposit earthy phosphates. But even very large doses by the mouth do not exert any appreciable influence over the chemical reaction of such urine. As general tonics to the system, in such circumstances sometimes needed, they may be useful. But a different result follows administration of the alkalies. By their means we can act speedily and powerfully on the kidney secretion, and change an acid to an alkaline urine if it be desired. They have long been regarded almost in the light of specific sedatives to the bladder under circumstances of inflammation or irritation, and are perhaps entitled to more uniform confidence in such cases than any other remedies known.[2]

The observations of Dr. Owen Rees on this subject deserve notice. He asserts that, even when the urine is alkaline, alkalies are often productive of a greater benefit than any other remedy, allaying the irritation produced in the viscus by urine of that character, and tending to restore it to its normal acidity. It appears to Dr. Rees, to quote his own language, 'that an alkaline state of urine very frequently resulted from disease of the mucous surfaces over which the urine had to pass before excretion, and that urine which had been secreted of healthy acid character was, owing to this condition of the membrane, often passed of strongly alkaline reaction, and containing a deposit of the earthy phosphates as a consequence. The patient, in fact, was secreting healthy urine . . . the variation from the normal state consisting in the urine being rendered alkaline by disease of the mucous surface of the urinary passages. That the discharge from the urinary mucous membrane, when inflamed, was of a strongly alkaline character, and sufficient in quantity to neutralise the acidity of healthy urine, I proved by an experiment on the inflamed surface presented by the fundus of an inverted bladder which I examined in a case of deficient parietes of the abdomen, a congenital deformity not very uncommonly met with. In confirmation of the above views, I took the opportunity of adducing the fact that in several cases of alkaline urine I had succeeded in obtaining the secretion of healthy acid reaction by rendering the urine less acid on secretion and therefore less irritating; and by perseverance in this plan till the inflammatory condition subsided, the normal acid reaction of the urine, as it passed from the bladder, was eventually obtained.'[1]

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[1] Half-pint doses, two or three times a day, are recommended of a decoction of Uva ursi and Pareira brava combined, in Blackie's *Disquisition on Medicines that dissolve the Stone*, &c., p. 182. London, 1771. This is but one illustration among several which might be referred to of similar date.

[2] This view was held by Mr. Adams, *Anatomy and Diseases of the Prostate Gland*, 2nd ed. 1853, pp. 42, 43. He compares their influence on cystitis to that of quinine in neuralgia, giving the preference, among the ordinary alkaline salts, to carbonate of soda.

Proceeding on this principle, Dr. Rees recommended those salts in which the alkali is combined with a vegetable acid, especially the citrate of potash and the tartrate of potash and soda; the latter if the bowels require a laxative, and the former if this is not the case. Both exercise a powerful influence in neutralising the acidity of the urine, notwithstanding the aperient action which is associated with one of them. It is almost needless to say, that the value of liquor potassæ has been recognised from time immemorial, and that it is still a favourite remedy when an alkali is required. As a rule I prefer it in almost all instances to any form of potash salt. But the citrate is, perhaps, the best neutral salt to employ when objection to administering the pure alkali exists; and in a series of papers on Irritability of the Bladder, which appeared in the 'Lancet' as long ago as in 1854, I stated my belief that it was far preferable to Vichy water.[2] Its value in this respect was observed and pointed out at the commencement of the present century.[3] On the other hand, alkalies do not invariably exert a beneficial influence in these cases; the alkaline state of the urine is sometimes increased by their moderate use. And it occasionally happens that alkalies in full doses augment the irritability of the bladder; especially in the form of citrates or bicarbonates, by their diuretic action, which rarely if ever happens from liquor potassæ. In reference to Vichy water, mentioned above, my opinion is unchanged—namely, that it is an undesirable form of alkali in urinary complaints, and in all circumstances inferior to potash.

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[1] 'On the Pathology and Treatment of Alkaline Conditions of the Urine.' By G. Owen Rees, M.D., F.R.S. *Guy's Hospital Reports*, Third Series, vol. i. 1855, pp. 300, 301.

[2] *Lancet*, 1854, vol. i. p. 489.

[3] It is interesting to observe that it is no new observation that the salts formed by a combination of the vegetable acids with the alkaline bases are capable of communicating, when taken by the mouth, an alkaline reaction to the urine, although it is, comparatively speaking, a recent achievement of chemistry to explain this. More than seventy years ago Sir Gilbert Blane was in the habit of prescribing citrate of potash for the express purpose of rendering the urine alkaline. See his paper 'On the Effects of Large Doses of Mild Vegetable Alkali,' read Nov. 1, 1808, to 'the Society for the Improvement of Medical and Chirurgical Knowledge,' *Trans* vol. iii. p. 339.

In those rare cases in which the urine is secreted with deficiency of acid, and the earthy phosphates are habitually thrown down, lemon-juice is, perhaps, one of the most certain forms of acid to affect the reaction. But the cases with which we have to do are not in this category: the alkalinity is produced in the bladder, the urine arriving there from the kidneys with its normal amount of acid, as may be easily demonstrated by the catheter. Benzoic acid has a like influence, but is less easy to administer from its extreme insolubility in water. When it can be taken, and does not disagree with the stomach, it sometimes not only acidulates the urine, but subdues frequent micturition. Twenty grains require a drachm and a half of rectified spirit for solution, which may be taken in a wine-glass of water, when it is precipitated in a very divided state, and should be instantly swallowed. Or it may be given in powders, rubbed up with a half or equal weight of white sugar; or it may be suspended in simple syrup, or in the mucilage of acacia. Perhaps a better form still is that of pill, made by compounding 3 grains with 1 minim of glycerine, two or three to be taken three or four times daily.

Boric acid

3. Irritability of bladder, with pain during the repeated efforts to make water, is one of the most distressing accompaniments of the affection. The patient becomes worn and exhausted by loss of rest and sleep, if these are not ensured by sedatives and opiates; the latter, especially, being usually of great value. Opium and its numerous derivatives offer the most efficient means of relieving all the distressing symptoms, which are referred to here. The suppository is, for many patients, one of the most efficient forms of administering it. The old formula of 'soap and opium' has long been advantageously replaced by a salt of morphia, the acetate or hydrochlorate, in quantity varying from a third to a half of a grain to commence with, in twenty grains of cacao butter; augmenting the drug, little by little if compelled to do so, through the persistency of painful conditions. It is not an uncommon practice to combine belladonna with morphia in prescribing the suppository, and it may occasionally be desirable to do so if uncontrollable straining is present, but when there is already impaired power to empty the bladder, it does harm by paralysing the muscular fibres of the bladder, and thus sometimes entirely depriving the patient of power to expel his urine. Perhaps a combination with a few grains of hyoscyamus, conium, or lactucarium, may occasionally be made with advantage.

When enemata are employed instead of suppositories, they should be small in quantity and mucilaginous; as, for example, one or two ounces of starch or barley-water, containing from forty to sixty minims of laudanum. The fluid form ensures a more rapid action, when such is required.

In some circumstances it is more convenient to give morphia by the mouth, as when the dose is to be frequently repeated in the course of the day, or at night. Very small doses sometimes relieve a form of irritability which may be partly due to hyper-sensibility, or mental excitement, or to want of power in the will to exercise proper control over troublesome wants to micturate, such as a twelfth of a grain every three or four hours. But where there is more or less of inflammation, with muco-purulent urine, the fourth of a grain, or a third, may be necessary two or three times during twelve or eighteen hours, according to the intensity of the suffering. Not infrequently morphia deranges the digestion so severely as to become almost inapplicable to the unfortunate patient; and then we must have recourse to other forms, such as the bimeconate, Davenport's chlorodyne, and nepenthe, any of which may agree in the exceptional conditions referred to better than the officinal salts. Better than all, for some patients, is the method of subcutaneous injection, and thus a good night for a suffering patient may often be ensured with greater certainty than by any other means. The sedative influence of the agent takes place with a rapidity and efficiency which no other method of administering ensures.

4. When there is phosphatic deposit in the urine, or there is much mucus, or it is ammoniacal or fetid, much benefit may often be derived from injecting the bladder. Indeed, these are the circumstances in which this treatment is especially applicable. The formula most employed formerly was the dilute nitric acid, in the proportion of half a drachm to the pint of water, which is sufficiently strong to commence with, afterwards gradually increasing to, but not exceeding, two drachms. It is not desirable to use any strongly medicated injection when there is much purulent secretion with sanious discharge, and when great pain is experienced. The quantity thrown in must depend upon the capacity of the bladder, and will vary from two to four ounces.

One of the best injections in cases of muco-purulent secretion from the coats of the bladder, and disposition to deposit triple phosphates, is a solution of the acetate of lead. The best mode of using it is as follows: a flexible catheter having been passed into the bladder, the external orifice is to be connected with an indiarubber bottle, and two or three ounces of plain warm water are to be injected, never using a quantity sufficient to produce uneasiness, much less pain, from distension of the viscus, and after remaining about half a minute, the water should be permitted to flow out. A solution of acetate of lead having been prepared, of the strength of one grain to four ounces of warm water, a small quantity of this should be slowly injected, allowed to remain about half a minute, and then to run out. This may be used once, twice, or even three times daily. In no case is it desirable to exceed one-third of a grain of the acetate to the ounce of water, and this would be, in most cases, undesirably strong.

When the urine is fetid, and full of bacteria, no better injection can be employed than a weak solution of carbolic acid; for example, one part to 2,000, or to 1,000, as the strongest, of water. Using the four-ounce injecting bottle as a convenient measure for most purposes, one drop of the pure acid to that quantity of water will give the latter formula, or nearly so, and two drops the first-named strength. Other useful forms are—twenty grains of boracic acid in four ounces of water; half a drachm of boroglyceride in four ounces; or, biborate of soda a drachm, glycerine four drachms, in four ounces of water.

tions

The two latter are indicated when soreness, rather than frequent micturition is complained of, and when there is a little blood tint in the muco-purulent deposit thrown down by the urine on standing.

In this latter condition, however, no injection appears to me so valuable as a very weak solution of nitrate of silver, used once or twice a day. It should consist of not more than half a grain, at first, in four ounces of distilled water; and should be very slowly strengthened, and then only if the addition is easily borne. A little smarting is to be expected perhaps for half an hour after the injection has been made, but more than that, as a rule, is not to be incurred. In using all these injections it is understood that they may be retained about a minute within the bladder, and then the chief part of the fluid is to be withdrawn. They should be generally used at a temperature of from 98° to 100° Fahr. As a rule, not more than one and a half or two ounces of any fluid should be introduced into the bladder at one time. In this way the chances of producing irritation are reduced to a minimum, and the best result from washing out is obtained.

5. A frequent accompaniment of enlarged prostate is the appearance of blood in the urine. It may be simple unprovoked hæmorrhage from some part of its surface, or it may be the result of passing an instrument. In the latter case, it will sometimes take place, although passed with the greatest care and without pain, so ready to bleed is the organ in some states when enlarged; but this is an exceptional occurrence. Or it may be due solely to the use of silver or other inflexible catheters, and disappear by substituting a coudée or vulcanised rubber instrument. It has been said that such habitual disposition to bleed is due to some ulceration at the neck of the bladder. This is a very rare occurrence, but there is often a congested condition of the mucous membrane there, and then the occurrence of occasional bleedings is readily accounted for.

When this condition is believed to be present, the best mode of dealing with it is to make an 'instillation' with a solution of nitrate of silver—say of three grains to the ounce, or up to five grains if the first fails. The mode of employing it is, after drawing off all the urine, to pass to the neck of the bladder a bulbous-ended tube prepared for the purpose; to this is attached a syringe, furnished with a screw piston, and containing a drachm of the solution (see figs. 26 and 27). The tube is now very slowly drawn out about two or three inches, the operator simultaneously turning the screw so as to inject the quantity named, very gradually, during the movement. It is obvious that in this manner the whole of the prostatic urethra and neck of the bladder will have been subjected to the action of the solution. Two or three days should elapse to test the result before repeating the application, if necessary to do so.

FIG. 26.

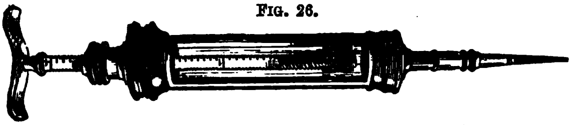

FIG. 27.

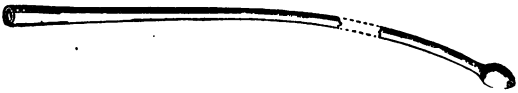

Fig. 26. Syringe for 'instillation' of fluid at the neck of the bladder.
Fig. 27. The flexible tube, with opening at the end.

When hæmorrhage is very slight, it requires no special treatment beyond increased care in the use of instruments, and the observance of perfect quiet for a short time after passing one. A change in the form, or in the kind, of instrument will sometimes cause it to disappear; or the employment of one that is one or two sizes smaller than that which has been habitually used. Unless produced by rough or careless handling in the daily use of the catheter, the most frequent cause of bleeding, it is very rarely severe or obstinate.

But if the amount of blood lost is considerable, and does not diminish, in spite of great care in the local treatment, it is necessary to employ internal remedies. Nevertheless, I have not much confidence in their utility in these circumstances. Thus the surgeon should select from the following agents, or try them in succession, if necessary:—Gallic or tannic acid, five to seven grains, with or without a few minims of liquor opii, three times a day, or more frequently if necessary; alum, or iron-alum, in ten or fifteen grain doses; matico in tincture and infusion; sulphuric acid in infusion of roses; acetate of lead and opium; preparations of ergot or ten to fifteen minims of turpentine, suspended in mucilage, and frequently repeated. Sometimes preparations of iron are indicated, especially the sesquichloride, and may be given in the form best adapted to agree with the patient's stomach. Mr. J. Adams preferred the use of alkalies in these circumstances, stating that—'of internal remedies, the simple salts of soda and potash, as the carbonates, in small and repeated doses, are decidedly preferable to acids.'[1] Sir B. Brodie speaks of one case in which hæmorrhage ceased during the administration of Ruspini's styptic.[2] I have used it, but without observing any advantage. I may say the same of tincture of Hamamelis.

If the hæmorrhage is dangerously large, the bladder becoming distended, and it may form a large tumour extending towards the umbilicus, other means must be adopted. It is usual to apply ice in bladders to the perineum and hypogastrium, the patient maintaining the most perfect quiet in bed, his person being lightly covered, and the bedclothes elevated from the body by means of a cradle. Two or three ounces of ice-cold water may be frequently injected into the rectum, if it can be done without disturbing the patient too much by producing action of the bowel, which in this quantity it is not likely to do; or better still to introduce small pieces of ice, like large suppositories, into the bowel. It has been recommended that a catheter should be passed into the bladder and the clot broken up; and that efforts to remove portions of this should be made by applying an exhausted gum bottle or syringe to the instrument. I do not approve of this course, unless it is rendered absolutely necessary by retention of urine, which is rarely occasioned by the presence of the clot, since fresh hæmorrhage may be excited by this practice. Some of the best results I have seen have arisen when all mechanical interference has been declined. In one case thus treated, the bladder was so distended with clot as to resemble the uterus of a pregnant woman. The patient was very exsanguine, and had a small and very feeble pulse. Opium was given every hour with gallic acid, until it allayed the painful and spasmodic straining to evacuate the contents of the bladder, which is usually present, and causes great distress; and nutriment in teaspoonfuls constantly; ice locally; and absolute quiet. Fresh blood ceased to ooze by urethra, and in a few hours urine, so thick and deeply coloured as to resemble grumous blood, passed. In the course of forty-eight hours it gradually became lighter in colour, the bladder smaller, and ultimately the whole of the clot was dissolved, and came away in solution; and an excellent recovery followed. The indications are exceedingly plain not to interfere, provided there is not absolute retention. The breaking-up or otherwise disturbing the clot is liable to provoke fresh bleeding; the hasty removal of the vesical contents is extremely likely to open orifices of vessels which had been closed by plugs of clot within them, and pressed upon by the contained mass, besides presenting a fresh cavity into which more blood may be poured. Moreover, there is no ground for regarding the clot as a great evil, which must be got rid of at all hazards; much less for adopting such a mode, recommended on no mean authority, as injecting several ounces of a strong mixture of acetic acid and water into the bladder in order to effect solution. The solvent power of the urine is probably not only the most efficient, but the safest of all agents in effecting the object desired.

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[1] *Op. cit.* p. 116.

[2] *Op. cit.* p. 201.

It nevertheless happens in a few cases that some mechanical means must be adopted to remove firmly adhering coagula, and the bladder has even been opened above the pubes for that purpose,[1] but such a condition is happily extremely rare. It is true that the distress occasioned to the patient by urgent wants to micturate and uncontrollable efforts to empty the distended bladder, with terrible pain and spasm, indicates that something should be done for the removal of the coagula. In these circumstances, the influence of opium, either by the mouth, or subcutaneously, should be first thoroughly tested before resorting to instruments. But if, the pain and straining being thus subdued, there is still no urine passing or almost none, delay to use mechanical means would no longer be prudent. Dieulafoy's aspirating needle should first be tried, as a small quantity of fluid thus removed from time to time affords great relief. If this really fails, the next step is to attach the catheter to a powerful stomach-pump, and then withdraw carefully a considerable portion of coagulated blood. A strong aspirator, such as used in lithotrity, attached to an evacuating catheter, say No. 13 or 14, not more, in size, is an efficient agent in such an emergency. Now and then a good surgeon has relieved a dangerous retention and saved a life in such an emergency, by applying his mouth to the end of the catheter when no other means were attainable. A small quantity of clot removed often affords the means of spontaneous exit to much more, and suffices to give efficient relief. Afterwards cold, even iced, water, or infusion of matico, in quantities of only two ounces at a time, may be injected to check further bleeding; and a flexible catheter may be left in the bladder subsequently, if no urine can be voluntarily passed.

6. A distressing result of enlarged prostate is sometimes incontinence of urine. By this I do not refer to the overflow from engorgement relievable by the catheter, usually termed incontinence, which has been already fully considered, but a real inability on the part of the bladder to retain more than, at all events, a small quantity of urine—a condition, therefore, in which the calls to make water are necessarily frequent, and cannot be resisted. As soon as the bladder has received some one, two, or three ounces of urine, it begins to flow, in the absence of any voluntary efforts on the part of the patient. This may

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[1] Mr. A. Copland Hutchinson, with the concurrence of Sir A. Cooper, opened the bladder from above the pubes, and removed a pint of coagulum, only twelve hours after the occurrence of hæmorrhage. He felt enlargement of the prostate from the cavity of the bladder. The patient died three days after the operation, and no *post mortem* was made. *Lond. Med. Repository*, vol. xxii. p. 128. 1824.

occur, although rarely, as has been already shown in the Tenth Chapter, from peculiarity in the form of the enlargement preternaturally opening the vesico-urethral orifice. If, then, the frequent micturition does not depend on a cause relievable by medicine, such as that occasioned by irritability or inflammation of the mucous membrane of the bladder, but on some organic source of the kind described, a proper receptacle (often useful in the latter case also) is the principal remedy, and should be almost constantly worn. Such are manufactured of indiarubber, and they most efficiently provide for the necessity. They are, however, too well known to render any description necessary here.

7. Another result of obstruction at the neck of the bladder from enlarged prostate is a susceptibility to congestion and inflammation in the organ from very slight causes; and a few hints respecting its management will close this section of the subject of treatment.

Various circumstances, of which the most common are sitting on a damp or cold seat, especially out of doors, general exposure to cold, the movements encountered in a long journey, horse exercise, indulgence in alcoholic stimulants, and sexual excitement, will produce in a sudden manner an attack of increased difficulty in making water. Sometimes also, but not commonly, this symptom may be accompanied by a more or less profuse discharge from the urethra of a muco-purulent character, sometimes tinged with blood; and not infrequently by a slight attack of fever. The attack subsides with rest in bed, hot fomentations, hot hip-baths, a mild aperient, and sedative treatment: warm enemata may also give relief. The bladder must be relieved in the usual manner, but generally with a smaller or softer catheter than might be otherwise employed, if the urethra is more tender than usual. Occasionally, also, a few leeches to the perineum or around the anus are useful. The treatment may not be otherwise antiphlogistic, as the age and constitution usually met with in these patients contra-indicate depletion. Such attacks are due rather to passive congestion than to acute inflammation, and are widely different from the acute prostatitis already considered in the Third Chapter.

II. The general treatment and management of patients with enlarged prostate is next to be considered.

It is of great importance to maintain all the functions of the body in health, since any slight derangement is liable to augment the urinary symptoms. A fit of catarrh, or of indigestion, and especially constipation, is apt to produce increased obstruction and irritability of the bladder. The principles, then, on which the diet, regimen, and general management of the patient are founded, will be easily understood and applied. Modifications may be necessary for individual cases; but a general plan is sketched here, from which material deviations will not probably be often necessary.

First, in the matter of diet, the patient should restrict himself to such plain, simple, but nutritious food as his experience has shown that he can easily digest. Moderately cooked and tender meat, of which the best in most circumstances is mutton, may be taken perhaps once a day, to be often replaced by poultry, game, or fish, with well-cooked vegetables or fruit, the former habitually, the latter occasionally; home-made or whole-meal bread should be used, not less than thirty-six hours old; milk to be taken in small quantity if it agrees with the stomach; eggs in great moderation, alone or in farinaceous puddings: such are the principal varieties of food from which the diet should be selected. All that tends to derange the stomach and bowels, to tax unduly the digestive powers, to constipate the bowels, to over-excite the circulation, or to overload the system of an elderly man unable to take much exercise, must be avoided. Pork, and salted or dried meats and fish, highly-seasoned dishes, greasy sauces, pastry, cheese, and sweet dishes, all unripe and most uncooked fruit, all raw vegetables and pickles, should be generally avoided.

The question of alcoholic stimulants is often entirely an individual one, for which express rules cannot be given, except that in no case is more than a strictly moderate use of such to be permitted, while total abstinence is generally the safest course. There are some patients, perhaps, for whom the withdrawal of the accustomed two, three, or four glasses of wine per diem might be a hardship if not an injury. In such circumstances light claret, hock, or moselle present the best forms of stimulant. Port and sherry are not generally admissible, often wholly to be avoided, as are spirits also. There are other cases, perhaps exceptional, in which light bitter beer or, better still, well-made cider, neither sweet nor acid, agrees better than any other dietetic stimulant. Whatever is selected of this kind should be regarded as the single article of use, and variety should not be indulged in. During an access of inflammatory symptoms the stimulant should be withdrawn, if necessary; and, when the patient has not been accustomed to it, or feels as well or better without it, habitual abstinence should be encouraged.

The clothing should encourage and maintain a due action of the skin. Flannel or woollen garments should cover the trunk and the limbs, and all changes of temperature should be efficiently provided for. Elderly patients often suffer, as the season of autumn approaches, from a foolish prejudice against unnecessary wrapping. The lighter summer flannels should, early in this season, be exchanged for a heavier description. Any chill or check to the transpiration by the skin is attended with danger of internal congestion of the prostate in the subject of enlargement. Damp must be avoided, or removed after exposure, especially from the feet, without delay; the lower limbs should be kept habitually dry and warm, a habit of the first importance, as freedom of circulation and healthy vascular action here is one safeguard against the recurrence of congestion elsewhere, and particularly at the point which demands especial attention.

The healthy functions of the skin must be promoted by habitual tepid sponging, and occasional warm baths. The warm foot-bath should be frequently employed, on the principle just alluded to.

The question of exercise is one of importance. The subject of enlarged prostate must not be encouraged to believe himself too much an invalid, but must exert his physical powers, as far as they exist, in daily exercise in the open air, of which walking is decidedly the best form. Riding is often out of the question; the movement of trotting is sometimes prejudicial; bleeding may be caused by it, by a long drive over rough roads, or indeed after a long railway journey, and, at the same time, increased difficulty in micturition. Such an occurrence, however, must naturally provoke suspicion as to the presence of calculus, even although little pain is complained of. On ordinarily smooth surfaces, carriage exercise may be added to, but should not supersede, that of walking, where the latter can be taken; if not, the former must be substituted. No exercise should be carried to undue fatigue, and after it rest in the horizontal position is desirable. Neither should the patient withdraw too much from intercourse with cheerful society, as some, under a morbid sense of the gravity of the complaint, are apt to do. Such a disposition, although sometimes manifested at the onset of the symptoms, gradually disappears in most cases; while in some others the complaint depresses the patient for the remainder of his days, and even perhaps tends to shorten them. He should be told that there are many men who, on account of prostatic enlargement, have long been obliged to remove the whole of their urine by catheter, being unable to pass any naturally, and who, nevertheless, are so actively engaged in the pursuits of life, that their daily associates are wholly ignorant that the infirmity exists. The habitual temper of mind exhibited by the patient is to be noted, since a desponding one is prejudicial, tends to encourage the steady progress of disease, and to unnerve his constitution for resisting its casual attacks. The opposite state must be sedulously encouraged, not merely as a therapeutical means of some importance, but as the legitimate result of a proper estimate of his complaint, so susceptible of palliation, so slow in progress as it is in the majority of cases, and so little prone to shorten life materially where judicious care and management are exercised. To assist in producing this healthy and natural state of mind, occupation of a cheerful character, suited to engross the thoughts and energies of the patient, should be found, if possible.

The mental and moral management of the patient are to some extent indicated by these few remarks, which a sense of their importance has impelled me to make. But it may be necessary sometimes to remind the patient of the evil effects which may result from great excitement of all kinds. Mental disquiet and anxiety, when excessive, often exert an unhappy influence upon the urinary function in these cases. Undue indulgence in sexual excitement must be guarded against; it may be even necessary occasionally to advise abstinence from intercourse, when obviously followed by ill effects; otherwise the moderate exercise of the function is, in some instances, a source of relief rather than the contrary.

III. The special treatment to be directed against the enlargement itself.

This resolves itself into two distinct parts,—the medical and the mechanical.

The medical treatment has hitherto failed to show any power to effect a reduction in the size of the enlarged organ. Nevertheless many agents have been administered for this purpose. One of the earliest on record is hemlock, which probably gained its reputation, or rather its introduction into practice against enlarged prostate, independently of its ancient celebrity even from the time of Pliny for the 'reducing of all tumours,' from a remark of John Hunter to the following effect: 'I have seen hemlock of service in several cases. It was given upon a supposition of a scrofulous habit. On the same principle I have recommended sea-bathing, and have seen considerable advantages from it; and, in two cases, a cure of some standing.'[1] There can be no doubt, from the tenor of this passage, that Hunter alludes to the enlargement which occurs from effusion after acute inflammation in young subjects, and not to the totally different affection now under consideration—a distinction which even now does not seem to be always sufficiently maintained. On the next page we learn that Hunter had heard of the virtues of burnt sponge in a single case; and in another, of benefit derived from a seton in the perineum, as long as it continued open; the age of the last case, twenty years, being given. It is very evident that these have no bearing whatever upon our subject, and there is no reason, therefore, for founding any treatment on the practice referred to. The reputed efficacy of hemlock in the resolution of enlargements, particularly of the lymphatic and of the mammary glands, may rest on evidence, but there is no proof of its utility in prostatic hypertrophy.

Mercury has been written about as a remedy, and, although never highly recommended, has been spoken of as 'worthy of a trial.' If there is one agent more than another for the administration of which no indication in this complaint exists, it must be mercury. I cannot conceive an elderly patient with hypertrophied prostate being otherwise than injured by a mercurial course, and must protest against its admission into a catalogue of medicines having the slightest claim to influence favourably the disease in question.

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[1] *On the Venereal Disease*, 2nd ed. p. 174. London, 1788.

The hydrochlorate of ammonia enjoyed for a time a considerable reputation in Germany when Dr. Fischer of Dresden had claimed for it, in 1821, the power of reducing senile enlargement, if taken in sufficiently large doses. Several reported favourably as to its powers, the dose recommended being at first 15 grains, four times a day, which was increased to double and at last to three times that amount: larger quantities produce unpleasant symptoms. No result was to be expected until it had been taken four or six weeks: after an interval it was to be again administered for six or eight weeks longer: the full dose of two or three drachms daily being employed during the greater part of that time. Later experience has proved that the remedy possesses no value in hypertrophied prostate.

Iodine and its combinations have been put in requisition pretty extensively, with a view to the removal of prostatic enlargement, and a considerable degree of success has been claimed as the result. The known power of this substance in effecting the resolution of numerous swellings of the lymphatic glands, of the thyroid gland, and other tumours, naturally induced a trial of it in this affection also. The late Mr. Stafford first called the attention of the profession to it with this view in 1840, and in 1845 published a second edition of his work, giving the result of further experience, and the opinion which he formed therefrom was expressed in the preface in the following terms: 'I have very little hesitation in saying, in the general cases of enlargement we meet with, success will attend the treatment, if it be properly effected and persevered in for a sufficient length of time.'[1]

Mr. Stafford's plan consisted in administering iodine internally by suppositories in the rectum, occasionally by the mouth, and in applying it to the urethral surface of the prostate in the form of a weak ointment; commencing with one grain of the iodide of potassium to the drachm of simple cerate, and increasing it to ten or twenty grains to the drachm, sometimes even adding to this a small quantity of the pure iodine. He states that his success was complete with numerous cases of the complaint in advanced age, as well as in that form to which young men are subject.

On analysing the cases detailed, twenty-seven in number, eleven only can be regarded as examples of the enlargement of old age, and in these the inference depends on the evidence afforded by the author's examination, by exploration of the rectum. In several of the others, an enlargement confined to the 'middle lobe' was diagnosed, because there had been difficulty in introducing an instrument near to the neck of the bladder, no enlargement being presented in the rectum. These, of course, are rejected—first, because existence of the difficulty described is no proof that enlarged 'middle lobe' exists; and secondly, because it is not very common to find this form of enlargement unaccompanied by augmentation of the lateral lobes also. In other cases confirmed stricture was present; when, if difficulty in drawing off the urine was experienced after the catheter had been passed through the contraction, enlargement of the 'middle lobe' was in consequence affirmed to exist. But the co-existence of senile enlargement with stricture is not common, while difficulties in traversing the posterior or prostatic part of the urethra after a stricture has been passed, no hypertrophy existing, are familiar to every surgeon of experience from other and well recognised causes. Lastly, the remaining cases ranged between 21 and 40 years of age; the affection generally followed a severe gonorrhœa; and they were examples of enlargement from prostatitis in early life.

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[1] *An Essay on the Treatment of some Affections of the Prostate Gland*, 2nd ed., preface, p. vii. By R. A. Stafford. London, 1845.

But eleven cases of success, in individuals ranging between 50 and 80 years of age, are recorded by the author without hesitation, and must be accepted or rejected according to the view which is taken of his powers of diagnosis, and accuracy in reporting. It is almost unnecessary to call to mind the fact that a very careful exercise of both these faculties is necessary in observing the increase or decrease in size of the tumour, the chief evidence respecting which is derived from rectal examination, especially if the progress be slow. The reader cannot, however, but be struck with the ease and confidence with which the author notes the effect of only two or three suppositories, as perceptible to his finger in the diminution of the enlarged prostate; with the general completeness of the cures vouched for, and the rapidity with which they appear to have taken place. From two to four months is affirmed to have sufficed, in several instances, to reduce the prostate of an aged person from 'the size of a hen's egg' to its natural dimensions (*op. cit.* p. 101, and elsewhere). It is unnecessary to say more than that these claims were unsupported by the facts adduced, and that similar results have not followed the numerous trials of his remedies which were at that period made by others. And thus it has come to pass that the use of iodine in these cases has very properly been relinquished.

Further, after a trial of other reputed remedies, including mineral springs, particularly those of Kreuznach, I fear it must be acknowledged that no therapeutical agent is known which has the power of reducing actual hypertrophy of the prostate. The volume of the enlarged organ may be lessened, so far as its increase of size depends on congestion or on inflammation; and as these conditions sometimes co-exist with hypertrophy, their removal may lead to the conclusion that the latter state has been beneficially influenced. The mode in which Kreuznach water was formerly used is appended in a note below.[1]

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[1] Tepid hip-baths, daily, of water, to which the bittern, or mother-lye, of the Kreuznach springs has been added, in varied proportions, beginning with half a pint or pound, according to the form in which it is obtained, to four gallons of plain

Of the application of iodine in any form or degree to the surface of the sensitive mucous membrane of the urethra I wholly disapprove. Nothing is easier than to pass down to the prostatic part a small portion of ointment impregnated with some chemical agent, and project it into the urethra there. But that it can remain there in any quantity, or for any time, adequate to the absorption of a part of the salt introduced, I do not believe; the greater part, if not the whole, is speedily removed to the bladder, and the utmost which can be expected to result is an amount of irritation corresponding to the quantity of the agent employed—an effect which, in any degree, is positively injurious.

Compression.—The influence of compression in retarding the progress of morbid growths and enlargements has long been recognised, and has been employed with success in discussing tumours and absorbing inflammatory products. The question has therefore arisen, can reduction of the enlarged prostate be effected by the same agency? Its solution has been attempted in various ways, but never, it would seem, with any success, the practical application of adequate pressure having been generally found to be impracticable, difficult of application, or irritating to the bladder. It has been supposed, moreover, that the benefit accruing from the use of large catheters in this complaint is in part due to the compression which they exercise on the prostate; and it is not absolutely impossible, although it is highly improbable, that beneficial influence may be thus exerted. It does not appear, however, to retard development, although it has been said to maintain a more patent state of urethra than would otherwise be found. It is evident

water at a temperature of 90° to 94°, or warmer if preferred; in this the patient should be seated for twenty minutes every morning.

The principal spring at Kreuznach employed for medical purposes is the Elizabeth Quelle; and for topical applications, the water of this spring is strengthened in saline constituents by the addition of the mother-lye after the elimination of the chloride of sodium at the Salt Works, which exist on a very large scale close by the town, at other saline springs. This mother-lye, of which the specific gravity is between 1·3 and 1·4, contains no less than between 2,000 and 3,000 grains of solids in 16 ounces. A late analysis gave the following result:—

In 16 ounces of the mother-lye there were—

	Grains.
Chloride of Calcium	1789·97
„ Sodium	226·37
„ Potassium	168·31
„ Magnesium	230·81
„ Aluminium	1·56
„ Lithium	7·95
Bromide of Sodium	59·14
Iodide of Sodium	0·05
	2484·16

Both this and the iodide of potassium were used with some bland decoction, as an enema daily, of about three ounces; to be retained as long as possible.

that a much more powerful act of compression than that which can be exercised by a catheter even of the largest size, is required, if the volume of the prostate is to be diminished by it, or the neck of the bladder rendered more patent.

Physick, the American surgeon, attempted to accomplish the object by distending with fluid a small bag of gold-beater's skin, previously rolled up and introduced, on the end of a catheter, into the bladder; and by then attempting to withdraw the dilated sac through or into the vesical orifice; and a successful result is claimed by Parrish.[1]

Subsequently, M. Leroy d'Etiolles attempted by means of metallic instruments to compress the posterior border of the neck of the bladder. He first of all employed straight, or nearly straight, sounds, by means of which, when carried into the bladder, it is not difficult, as may be readily understood, to make pressure with the hand, after a somewhat rude fashion, directly upon the floor of the vesical neck. As a modification of this method, and owing to the difficulty of introducing straight instruments into the bladder when the prostate is enlarged, he devised an instrument having the form of an ordinary prostatic catheter, the curved portion of which could be rendered straight at will, after its introduction into the bladder, by means of a stilet made of articulated portions capable of being brought into a right line through the agency of a screw in the handle of the instrument; and in this manner he succeeded in exerting a certain degree of pressure on the same limited portion of the organ.[2] After this M. Leroy proposed to dilate the vesical neck more equably in various directions, by employing an instrument with three expanding metal blades, and again also with the lithotrite of that period (1831–2). Other French surgeons have proposed to introduce a large curved gum-elastic catheter, and afterwards to forcibly straighten it by introducing a strong straight stilet.

Mercier speaks of having employed this method, and states that a flexible extremity to the steel stilet enables it more easily to traverse the catheter. But he also has devised a special instrument for dilating the prostatic portion of the urethra, or the neck of the bladder. It possesses the form of the 'bicoudée' catheter, but with two handles, so contrived that pressure in an antero-posterior direction can be exerted by means of a second portion, which, being glided along the shaft, and continuing its direction, furnishes two divergent blades, by which forcible dilatation can be made.[3] He has recorded good results from the proceeding, and believes that these arise not from any absorption of tissue produced by the pressure, but by a mechanical depression of the obstacle which exists at the neck of the bladder. In one of his cases he reports marked benefit from six applications of the instrument of about five minutes each.[1] Some other apparatus have also been designed in France, but of so complicated a nature, and so obviously inefficient for any practical purpose, that no description need be given in these pages. The foregoing attempts are only detailed here for the sake of illustrating the views which have at different times been held by various surgeons with regard to compression as a therapeutical agent in enlarged prostate, as well as the means which have been employed in order to accomplish it.

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[1] *Surgical Observations*, p. 258.

[2] *Exposé des Procédés pour guérir la Pierre*, p. 180 *et seq.* Par Dr. Leroy d'Etiolles. Paris, 1825.

[3] *Recherches, &c.*, 1856, pp. 174, 175.

After some experience, now many years ago, of the employment of compression in its simplest and most innocuous form, viz. by expanding an india-rubber tube with water, so as to exert a considerable influence on the neck of the bladder, I have long been of opinion that the risk encountered of irritating the parts does not compensate for any little benefit attained, and which can only be regarded as temporary in its character. I tried it fully by means of a special apparatus, described in my work, 'The Enlarged Prostate,' published in 1858, and I found no good result from the method, contrary to the hopes entertained, and the natural desire to remedy a difficulty if possible. But I subsequently wrote of all these and similar proceedings that they could not be recommended, believing that the progress of the disease is more certainly checked by good general management and the avoidance of irritation in every form, than by any specific attempt of a mechanical nature to reduce the tumour or dilate the neck of the bladder. Hence I confess it is somewhat surprising to find that anyone who is acquainted with what has already been tried as treatment of the kind described, should at the present day gravely propose to repeat it. Certainly, no one who has had a large experience of the prostatic diseases of advanced years ventures to use instruments sufficiently large to produce any diminution of the gland, or any dilatation of the canal which passes through it, by the agency of compression. He will, if he has tried such a method, have speedily learned that it is very easy thus to excite inflammation in an enlarged prostate and in the adjacent bladder, and not very easy to subdue it. The procedure aggravates the patient's sufferings, and does not in the least degree improve the mechanical condition of the parts. There is not the slightest analogy between the morbid deposit narrowing the urethra known as organic stricture, and that pressure or fulness to which the same canal is liable when surrounded by an enlarged prostate. In the former case the passage can be almost always benefited by mechanical agents, such as the dilating action exerted by the bougie. In the latter case the hypertrophied prostate is never diminished by pressure or compression, but almost invariably exhibits increased vascularity and tenderness as the result of the action of the instrument employed. Besides, it is an error to suppose that the inability to micturate, resulting from enlarged prostate, is due to narrowing of the canal, as is the case in stricture. The retention is due to closure of the neck of the bladder; in the interference with that delicate exit and its valvular action, which the pressure of newly formed prostatic growth in and about it has occasioned.

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[1] *Étude sur divers Points d'Anat. et de Path. des Organes Génito-urinaires*, p. 24. Paris, 1860.

Several times during the last twenty or thirty years, attempts have been made to reduce the volume of an hypertrophied prostate by passing through it a current of electricity. It is not difficult to make application of this agent; but, supposing that any advantage could be expected to result from it, the sittings must be very numerous and extend over a long period of time in order to afford it a fair trial in any given case. Were any marked benefit likely to arise, there would be good grounds for advising the patient to submit to the inconvenience even of such a course. Experience, however, does not warrant us in drawing any favourable conclusions respecting its employment. Thus, a case was reported in Paris [1] of marked success following the use of faradisation in 'hypertrophied' prostate. One conductor was passed into the rectum to the rectal face of the organ; the other was passed to the prostatic urethra. On examining the details of the case, there cannot be a moment's doubt that it was one of mere chronic inflammatory enlargement of the prostate, succeeding to gonorrhœal discharge: the age of the patient was forty-four years, a period of life at which neither dissection nor careful clinical observation has ever detected a case of hypertrophy of the prostate. The number of sittings was seventy, and extended over a period of six and a half months. In this time, under any appropriate treatment, it is more than probable that the reduction of such an enlargement would readily have taken place. After that time a claim for the power to dissolve or disperse the elements of obstruction, both in organic stricture and in hypertrophied prostate, was made by Dr. Mallez, of Paris. He once attempted to prove this by practical demonstration in the theatre of University College Hospital, on a stricture-patient in one of my wards some years ago, in the presence of Mr. Erichsen and myself, and utterly failed. Nevertheless, the claim was still occasionally heard of, although trustworthy evidence in support of it was never forthcoming. And we have still to learn, on evidence which admits of no dispute, that any form of electrical current has the power to dissipate, by producing absorption or otherwise, the organised tissues which constitute the morbid deposit of urethral stricture, or the elements of prostatic hyperplasia and hypertrophy.

Division of the obstructing portion at the neck of the bladder has been performed. Other operations have been also attempted for effecting a similar purpose; such as the excision or the crushing of a protruding portion, and even the ligaturing of a polypoid outgrowth. Respecting the division of an obstruction, barlike in its form, elevated from the posterior border of the neck of the bladder, it is no doubt a proceeding to be accomplished without much difficulty, with the exercise of ordinary care. If made at all, Bottini's mode with the electric cautery is probably the safest mode of proceeding.[1] In most cases, although not invariably, the bar is a prostatic development, and when well marked may perhaps in some cases be incised with advantage, and without danger to the patient. Such was the opinion of the late Mr. Guthrie. As, however, he introduced the consideration of this subject to the profession in connection with his views of another affection occasionally met with, altogether distinct from enlarged prostate, and to which he gave the name of 'bar at the neck of the bladder,' I shall defer any further remarks respecting the operative proceedings (which must be the same, or nearly so, whatever be the constitution of the obstruction in question) to the nineteenth chapter, which is devoted to an examination of that subject. In that place the various cutting operations which have been applied to the prostate will be considered at length. A very few words will suffice for the notice of crushing and the ligature. Some of our French brethren have performed on the living body these procedures, the first named not unfrequently. A portion, supposed to be the protruding one, is seized between the blades of a lithotomy forceps, or an instrument very similar, and is torn away, if possible, or crushed, so as to ensure a state of sphacelus in the part attacked. Jacobson's lithotrite has been also used, and is preferred for the purpose.[2] M. Leroy also described an ingeniously contrived apparatus for carrying a ligature round the pedicle of a polypoid tumour springing from the median portion of the prostate. It is engraved in his work, where he states also that he has used it with success.[3] No details of the operation are given, although, it must be confessed, they would have been exceedingly interesting, both in respect to the difficulties overcome, and the subsequent effect of leaving a putrid slough in the bladder, as a result of the process. Subsequently he designed an écraseur, contained in a canula of the form of a catheter, for the purpose of removing these outgrowths.[4]

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[1] *Gazette Médicale*, 1861. No. 70, p. 309.

The reason for mentioning most of these proposals rests mainly on their historical interest. As examples of practical surgery, or as indications to be followed, most of them have none, as will be seen by referring to the chapter already named. But from time to time such proposals are made as novel modes of treatment by persons who are not informed of what has been already tried and has already been found wanting. Illustrations of this practice are by no means uncommon; it is therefore desirable, in a treatise like the present, to mention, and even to describe, some forms of treatment even if they have become obsolete, and have been already proved to be futile if not injurious.

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[1] *Di un nuovo cauterizzatore.* Prof. Bottini. Bologna, 1874.

[2] The mode in which M. Leroy adapted the instrument of Jacobson to the purpose is explained and illustrated in the *Gaz. des Hôpitaux*, January 27, 1849.

[3] *Thérapeutique des Rétrécissements des Engorgements de la Prostate*, &c.; pp. 75 and 77. Paris, 1849.

[4] *Bull. de la Soc. Anat.*, p. 420. Paris, 1856.

CHAPTER XIII.

RETENTION OF URINE SUDDENLY OCCURRING FROM ENLARGED PROSTATE.

Urinary Retention from Enlarged Prostate, generally due to Congestion of the Organ; first indication, to relieve Congestion—Baths; second, to allay Pain and Spasm—Opium; third, Instrumental Relief—Catheters, various—Comparative advantages of—Modes of passing solid, flexible, &c.—False Passages the great cause of difficulty—Modes of avoiding them—Should the Bladder be emptied at once?—Should the Catheter be retained?—Catheterism unsuccessful, what means are to be employed?—Puncture of Bladder above Pubes; by Rectum; through Symphysis Pubis; Needle Puncture and Aspiration: comparative Merits of—Case—Perineal Operation—Conclusions.

It has been already premised that the term 'complete retention of urine,' here used, does not include or designate that chronic retention of urine so well known as a frequent result of enlarged prostate, but is intended to apply only to that urgent condition in which, from this cause, the patient has been suddenly rendered unable to relieve his bladder; a condition in which he is in a state of hourly increasing difficulty and danger, and from which it is not merely expedient, but necessary, in order to save his life, that he should be relieved.

Some external circumstances generally give rise to that exacerbation of the habitual symptoms which constitutes the state in question. In by far the greater number of cases, exposure of the surface of the body to cold or wet, or to both combined, is the agent which produces congestion in the already enlarged prostate, temporarily increases its volume, and occludes the already embarrassed urethro-vesical orifice. Whatever the cause, however, by which prostatic congestion is thus suddenly favoured, this is, in almost all instances, the essential nature of the obstruction. Hence may be inferred the first indication by which to direct our treatment, viz. to dissipate as much as possible internal congestion. The second is to allay pain, and quiet those involuntary but unavailing efforts to pass water, which the patient almost invariably suffers from to a distressing extent; thirdly, and most commonly, the indications just named notwithstanding, without delay, to draw off the urine, and, unless in very exceptional cases, by the natural passage of the urethra.

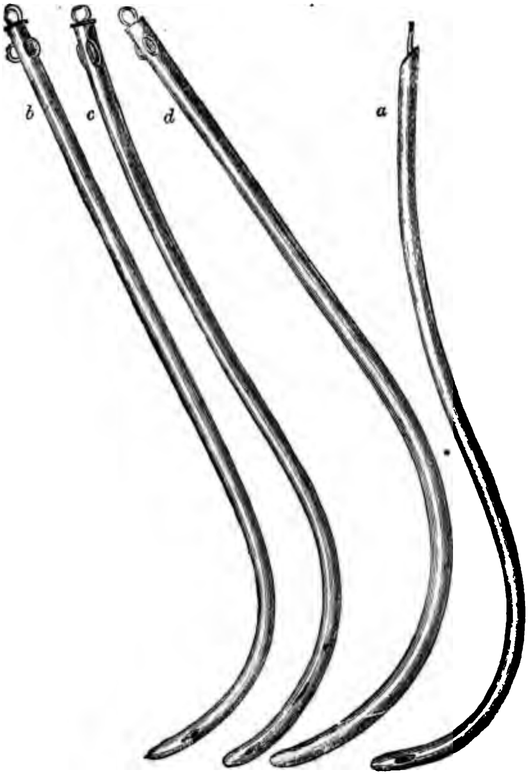
The first indication may be fulfilled by employing a hot hip bath, or a bath for the whole body. The temperature should be high, from 100° to 105°. Patients who have resorted to it frequently require a much higher degree of heat than those who are not so accustomed; and the duration of the bath may be about fifteen minutes, the heat being rather increased than diminished during that time. Before this period has elapsed a full effect is usually produced on the skin, and a considerable derivation from the internal viscera is accomplished. Meantime, however, if there be much suffering, and particularly if involuntary paroxysms of straining to pass urine are present, and instrumental relief is not within reach, some sedative should be freely administered. Opium is the best, and may be given by mouth or better still subcutaneously; the action of a suppository being too tardy.

With the third and last indication comes the question of the catheter; not a question as to the propriety of using it forthwith, delay being rarely desirable, but that of the kind of instrument to be employed, and of the best manner of overcoming the varied difficulties which may present. Let me premise, then, that with the exercise of care, and of ordinary skill, there should very rarely be failure to introduce an instrument safely through the track of the urethral canal. There are certain circumstances under which this is hardly possible, but such are fortunately of very unfrequent occurrence. The surgeon should be provided with silver catheters of the larger curve and length desirable for advanced cases of prostate, as well as with flexible catheters in variety.

First: respecting silver instruments: a prostatic catheter should be about No. 9 or 10 (English) in size, and should not be less than ten inches long, with a curve slightly larger and a little more prolonged than that of the ordinary catheter. For most cases this suffices; such an one is shown at *b*, fig. 38; occasionally longer instruments are necessary, measuring 12, very rarely 14 inches in length, with a curved portion which should comprise about a fourth to the third of a circle measuring from 4½ to 5½ inches in diameter. Two good forms are *c* and *d* at fig. 38, but they are necessary only for those cases in which the organ is very considerably enlarged. Besides these there is a silver coudée catheter, rarely serviceable; usually far inferior to the flexible instrument of the same form.

With respect to English gum-elastic instruments, almost any of those made for ordinary purposes are sufficiently long for prostate-catheters. The size should be about that named for the silver instruments. It is advantageous, indeed it is necessary, in order to render them efficient, to keep a few of these in preparation: that is to say, the catheter should be maintained constantly, during a considerable period of time, on a strongly curved stilet, describing almost two-thirds of a small circle—a curve, it is almost unnecessary to add, in which it would be impossible to employ it; but on removing the stilet from one which has been so treated for a few months, we possess an instrument which may be found in some circumstances to possess qualifications of extreme utility (fig. 25, p. 122). The value of this method arises partly from its ensuring that the beak, or last inch or two of the catheter, is sufficiently curved. However well curved the rest of the instrument may be, if the last inch be straight, it will, almost to a certainty, become engaged in the prostate, and will not pass over an enlarged median portion. This should never be forgotten in giving the intended curve to the iron stilet, which cannot be done with the fingers: the last inch can be well curved only with a pair of pliers. The chief advantage, however, consists in the fact, that a catheter so treated has a

FIG. 28.



a, Gum catheter mounted on a stilet of the proper curve for use; *b*, *c*, *d*, silver prostatic catheters of different curves—the Nos. 1, 2, and 3 of the instruments which I employ.

tendency to *increase its curve* as it goes down the urethra, instead of losing it, from the heat of the canal, as occurs with catheters not so prepared—for immediately before introducing it it is necessary to bend back the handle or stem of the catheter considerably in order to unfold temporarily the extreme curve which unfits it for passing; but the instrument naturally tends to return to that form, and doing so during the process of introduction, the best possible chance of succeeding is afforded when the prostate is large and difficult to be surmounted by the common instrument. Further, such a catheter also may be used, either with or without a stilet; in one case being a flexible, in the other an inflexible instrument; so that it possesses sometimes an advantage over metallic instruments in its capability of being adapted in form to any curve which the peculiarity of the case may appear to demand.

The French coudée or bicoudée catheters already described (page 120) are often the most serviceable in prostatic retention, and should be employed first: in the expectation that one of them, usually the former, will prove successful. If not, the English gum-elastic instrument, treated as just described, if one is at hand, may overcome the difficulty. If such a one is not to be had, much may be done by way of communicating the desired curve and quality by the use of hot and cold water. The English instrument possesses this advantage, that the surgeon can give it any curve or form he pleases while immersing it in hot water, which curve is rendered permanent, or at all events sufficiently so to be available for immediate use, by plunging it into cold water. It should be passed, so that the curve is maintained, and exists unspoiled, when the point of the instrument reaches the posterior part of the urethra. This requires a little dexterity, easily acquired by practice. Supposing the patient to be in the standing position, the well-curved gum catheter, previously oiled, is introduced with the penis directed rather downwards, but drawn over the curve of the instrument, while the shaft is kept close to the patient's abdomen, or, if he is very stout, is pressed backwards into his left groin. Nearly two-thirds of the catheter should be passed with the shaft in the direction described, so that the point passes well under the pubic arch, when, if the shaft is brought downwards towards the operator in the middle line, and gently pressed inwards at the same time, the point will rise over any obstructing prostatic eminence into the cavity of the bladder. If the patient be recumbent, the same principle of keeping the shaft close to the body must be adopted. If it fails to pass and has to be withdrawn, the curve and proper stiffness must be restored by the hand, and by plunging it into cold water before re-applying it to the patient.

In some instances the French bulbous-ended catheter (see fig. 29) may be successful. This instrument, which is generally straight, although sometimes made with a curve, owes its utility to its extreme flexibility, having no curve or force of its own. It follows the sinuosities of the urethra, and frequently finds a way which the stiffer instrument has failed to discover. The delicate soft end, surmounted by a bulbous swelling, which prevents it becoming engaged in a lacuna or other such obstacle in the urethra, insinuates itself, and the larger body of the instrument follows. In employing it the penis should be held out horizontally, the patient standing, and the catheter pressed in the same direction from first to last.

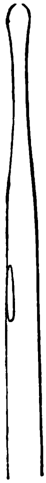


FIG. 29.

Of course, as a general rule, all flexible catheters are to be used without stilets, since the rigidity so produced destroys the very quality which is the source of their value. Nevertheless, there are some exceptions to this rule, and the stilet has sometimes a real value.

The use of the stilet is twofold. First, if the silver instruments are insufficiently curved, we possess the means of employing an inflexible instrument, although naturally supple, of any curve we desire, by first communicating the form to the stilet, which ought to be stouter and stronger than a wire. Secondly, it enables us to put in practice a manœuvre of considerable utility, well known as having been originated by the late William Hey, of Leeds. Many have derived an advantage from adopting it in circumstances of difficulty. It may be thus described: the catheter, mounted on its stilet, having been introduced as far as to the obstacle, the stilet is then withdrawn about an inch, which has the effect of increasing the curve and elevating the point of the catheter, so as often to carry it over the enlarged portion in a manner less easily accomplished in any other way.[1] The stilet should be so large that it cannot readily issue from the eye of the catheter in any backward or forward movement which may be communicated to it.

After all it may be necessary to resort to the silver catheter, if success has not been attained with the instruments just described. As it is desirable to follow a uniform manner in introducing it, the best mode of doing so may be described here. The surgeon, standing at the left side of his patient's bed, who should lie on his back in an easy position, takes the catheter lightly between the thumb and fore and middle finger of his right hand, which occupies the supine position, the former (the thumb) being, therefore, applied to the upper surface of the handle, close to the rings; the two latter supporting it below, and in a horizontal direction. The penis may be either held indifferently between the thumb and fingers of the left hand, or uniformly according to the following method, which is not without a certain convenience.

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[1] *Pract. Obs. in Surgery*, 3rd ed. pp. 399, 400. By William Hey, F.R.S. London, 1814.

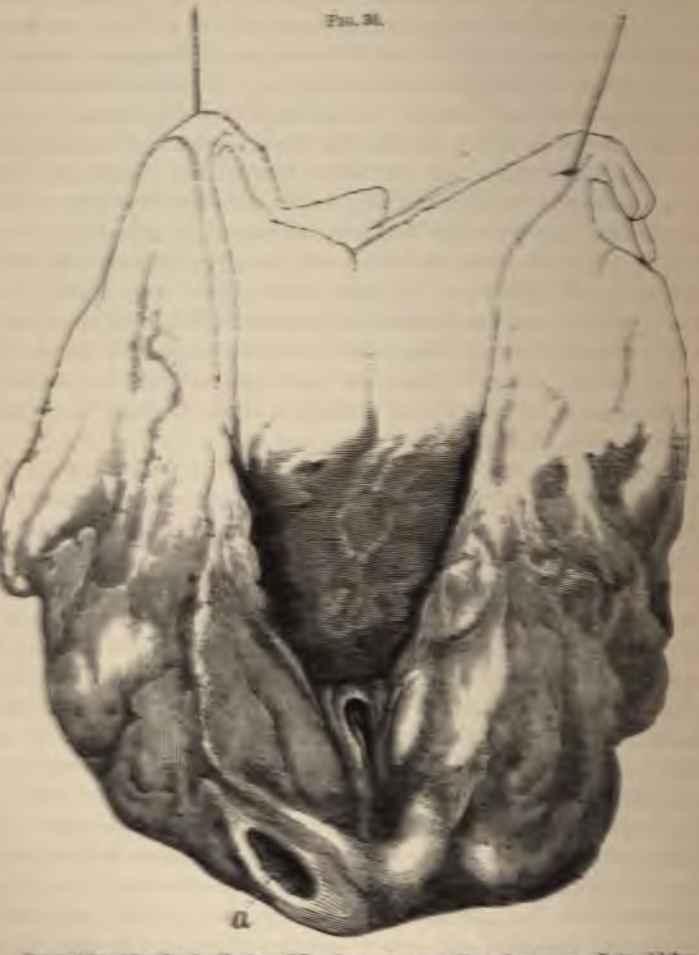
The left hand is in this case applied, the palm being upwards, so that the middle and ring fingers hold the penis just behind the corona glandis: the index finger and thumb are then at liberty to be applied for the purpose of retracting the prepuce, if necessary. The point is then introduced into the urethra, the direction of the shaft being parallel with the line of the left groin, and the instrument carried down as far as it will go without elevating the handle from the horizontal line. This is now gently carried to the median line of the body, and at the same time a little raised, so that the point enters the subpubic curve. The penis being now merely supported, the shaft of the catheter is brought to the perpendicular, and moved slowly downwards towards the interval between the patient's thighs, while at the same time slight traction is made upon it, so as to keep the beak of the instrument closely along the roof of the urethra and enable it to slide closely under the pubic arch; after which, unless the obstruction be considerable, it will soon enter the bladder, gliding over any little prominence at the floor of the vesical neck. Supposing that the difficulty is not overcome by this simple means, there remain but two modes of manœuvring which afford a reasonable chance of success with the silver instrument of the ordinary prostatic curve. The first is the attempt to follow more closely, or accurately, the upper aspect, or roof, of the urethra, either by withdrawing and sooner depressing the handle, or by employing an instrument with a longer and more strongly curved extremity, so as to override, if possible, a large tumour of the median portion, or other prominence of that part. The second is to incline the beak, when arrived at the prostate, either to the right or left, so as to pass through the sinus or hollow which, to a greater or less extent, exists on each side of such median projection, entering the bladder not over, but laterally, as regards the obstruction. These are the points which experience, as well as our knowledge of the pathological anatomy of the organ, indicate to be borne in mind.

A combination of the two instruments is affirmed by some to be occasionally useful. The mode of employing them is to take a full-sized silver catheter, No. 10 or 11 of a prostatic curve, but completely open at its extremity, as if the point were cut off. A flexible gum-elastic catheter, of a size adapted to fill pretty accurately the channel of the silver catheter, is to be passed through this, just so far that the point of the flexible instrument protrudes, forming an obturator; this apparatus being passed down to the obstruction, and the silver catheter being held by the left hand, the flexible one may be gently pushed onwards through the former, and may find its way into the bladder, when neither the silver nor the flexible instrument would pass alone. I can say nothing myself in support of such an attempt, and name it merely as resting on the authority of others.

In employing any manipulation hitherto mentioned, the instrument should be held with extreme lightness, and used only with gentleness and delicacy. By no other means can the operator learn to appreciate the kind of resistance which its point encounters; by the gum-elastic instrument especially he may be easily deceived if he uses an improper degree of pressure, which, instead of advancing, is, perhaps, merely caught in some lacuna, or pressed against a fold of mucous membrane, while the instrument, nevertheless, continues to disappear under the hand, by becoming bent within the urethra. No practised hand, however, can mistake the sense of resistance offered under these circumstances; nevertheless, it has ofttimes been a source of deception, and laceration of the passage has resulted. It is a trite remark of Civiale, that 'a catheter goes properly only when it is *swallowed* by the urethra; no quicker or more forcible movement is *allowable* there.' There is a truth conveyed by this remarkably appropriate simile, which should never be forgotten; the instrument should travel through the delicate, sensitive, and contracted mucous canal by a slow, continuous, and easy movement, resembling that by which the morsel travels from the fauces to the stomach. Forcible and rapid movements are apt to excite resistance, and to create obstacles which would with opposite treatment not be encountered.

The silver coudée instrument of Mercier having been mentioned as occasionally offering a chance after failure with other instruments, his mode of using it may be explained here. He premises that the idea of an instrument with a beak nearly at right angles with the shaft, and not more than three-fourths or seven-eighths of an inch in length, takes its origin from the peculiar form and size of the urethra, known to be assumed in largely developed swelling of the lateral lobes of the prostate. As has been shown in describing the anatomy of hypertrophy, the prostatic urethra is sometimes increased considerably in measurement from its floor to its roof, and the opening into the bladder elongated vertically, so that the canal forms a long oval in its recto-pubic diameter, instead of a spheroidal section, when distended by an instrument; and a kind of elevated step generally exists at the entrance to the bladder. The adaptation of the instrument to the formation described will therefore be seen, and the manner of using it is that directed by Mercier, although not precisely in his own words. The operator stands indifferently on the right or left side of the patient, who is lying on a couch or bed; the right being more convenient at the last step of the process, in which position we will therefore now consider him. Taking the penis in his left hand, and holding the catheter in his right, he introduces it in the ordinary manner as far as to the bulbous portion of the urethra, when the shaft is raised nearly to a right angle with the patient's body, but not to be depressed between the patient's thighs, as this action would tilt up the beak against the roof of the urethra, and not cause its advance along the canal, as in the case of the curved catheter; but there is to be a combination of the two actions of pressing in the line of the shaft and depressing, the degree of the latter to be regulated according to the advance which the beak is felt to be making as it glides through the deep portions of the urethra to the prostate: precisely according to the mode in which an ordinary lithotrite is passed. But if there is obstruction of the kind now under consideration, as soon as the instrument has obviously arrived at it, and will not advance farther by the means directed, its shaft is to be depressed until it nearly reaches the

FIG. 36.



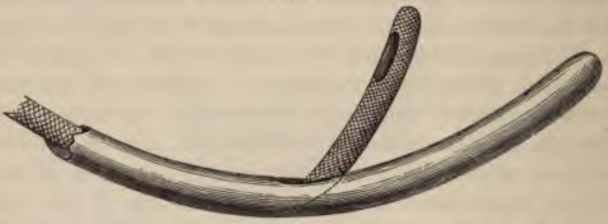
General hypertrophy (patient aged 74), from a preparation of my own. Lateral lobes blended with median portion formed a bank or bar nearly an inch high at right angles with the course of the urethra through the prostate. In the centre of the bar may be seen the distended sinus. At *a* is the cavity of an abscess.

horizontal line of the body along the interval between the thighs, in which direction it is to be gently pressed forward, so that the whole of its short beak, and not its point, advances along the prostatic urethra, the form of which in advanced cases of enlargement, as we have seen, admits of this action, until arrived at the step or bar at the neck of the bladder, over which the same gentle pressure, with slight variation of the direction, may cause it to glide directly upwards into the bladder. The adaptation of the instrument to this form of the urethra is seen by examining figs. 8 and 9, at page 59; as well as by fig. 30.

But the circumstances must be very unusual indeed in which such an instrument is necessary. By careful intelligent management the ordinary prostatic catheters, silver or flexible, will pass safely in all cases, however advanced, in which no lesion by instruments has been previously inflicted. The real cause of difficulty in these cases is the existence of false passages. It often happens that in previously-made attempts the catheter has perforated the obstruction, has passed out of the urethra, and has been carried onwards a considerable distance in the belief that it was still progressing towards the bladder, when it has really been boring a false route by the side of the rectum or the bladder. After this unfortunate occurrence, it follows that the instrument takes the wrong course much more readily than the right; in all cases it is difficult, in some almost impossible, to avoid it. Under these circumstances, a metallic instrument, the movements of which are susceptible of more complete control than the elastic one, should be employed. It should be as large as the urethra will admit; its point should be blunt, not tapering, and this should be kept throughout its course close to the upper aspect of the urethra by gentle pressure of the point upon it, so as to avoid the lower part where the obstruction is generally encountered, and the walls of the urethra are the most yielding; hence it is that the false passage is generally found in that situation. Arrived at the pubic curve, the handle should be depressed in order to elevate the point, and here the fingers placed on the perineum, to make gentle pressure on the convexity of the instrument, felt through the tissues, often aid its transit. But if, after passing some seven or eight inches, it is arrested in its course, the forefinger should be introduced into the rectum to ascertain the situation of the catheter, and if it is felt too distinctly, the mucous membrane only appearing to intervene between the finger and the instrument, we learn that it has left the urethra, probably by its floor or one of its sides, and has passed between the bladder and the rectum. In these circumstances the catheter is to be withdrawn three or four inches, the finger being still maintained in the bowel in order to be used as a fulcrum upon which to tilt upwards the instrument in the next attempt to introduce it—a method which often proves successful. If still failing, the instrument is withdrawn to the same extent, and its point, as it is again carried onwards, is to be pressed gently on the right side of the urethra; failing in that, it is to be introduced while pressing it on the left; since one side must be unbroken by the orifice of the false passage, and guided by the uninjured side it is probable that the catheter may be slipped into the bladder. These manœuvres, carefully and systematically employed, rarely fail in overcoming the difficulty presented by the conditions in question.

Mercier makes an apparently ingenious proposal in order to avoid a false passage of the kind described. The instrument consists of a metallic catheter with an eye, situated in the convexity, two or three inches from the termination of the instrument, which is solid beyond the eye. Having passed this first, the end of which, as usual, finds its way into the false passage and fills it, he slides down the hollow of the catheter an elastic instrument which, issuing at the eye in the convexity, above described, avoids the false passage, and has a good chance of following the course of the urethra into the bladder. (See fig. 31.) In practice, however, the plan of manipulation before described is preferable to this proceeding.

FIG. 31.



Mercier's instrument for avoiding false passages. It is a silver catheter, hollow up to the dotted line; beyond this is a solid portion which enters the false passage. A small gum catheter is passed along the instrument and issues at the orifice in its concavity to traverse the urethra in front of the false passage occupied by the extremity of the instrument.

The question occasionally arises, Is it desirable at once to evacuate the entire contents of the bladder when retention has existed for a considerable period of time? In very rare instances the removal of a large quantity of urine, amounting to several pints, has been followed by fainting and depression, from which the patient has never rallied. When the extent of vesical dulness is very considerable, it is therefore prudent to afford relief in a gradual manner, and, supposing that the catheter is retained, this may be easily accomplished. The removal of some 30 or 40 ounces will probably afford complete ease, and after the lapse of half an hour or an hour another portion may be withdrawn; in this manner the bladder may be gradually brought to adapt itself to the normal condition of contraction, which subsequently, as a rule, must be ensured at least once or twice a day.

The preceding paragraph appeared in the first edition, published now some twenty-five years ago. Since that time I have met with a striking illustration of the necessity of adopting the prudent course there indicated. The case became the subject of legal inquiry in the country, and an action at law resulted, at which my opinion was desired. The circumstances were these. An aged pauper had suffered from 'incontinence of urine' for some time, this condition being, in reality, as it so commonly is (see page 105), the sign of a greatly distended bladder. The amount of urine daily passed by continual dribbling was equal to, or nearly so, to the normal quantity, and the medical officer had concluded that it was unnecessary to pass a catheter. Circumstances, however, brought about the decision to employ an instrument; the old man was placed upright against the wall, the catheter introduced, and six pints of urine were withdrawn in full stream; but the water had no sooner ceased to flow than the patient fell, dead, at the surgeon's feet. Fatal syncope had taken place, doubtless, in consequence of the rapid removal of so large a body, which had previously pressed on the abdominal veins and viscera; the patient being, unfortunately, in the worst possible position for meeting the result. Had the precaution above recommended been taken, undoubtedly the sudden catastrophe would not have occurred.

A point of some importance remains. A catheter having been introduced with some difficulty for the relief of retention, should it be permitted to remain? This question is answered negatively and affirmatively by different authorities. In support of the negative it is said that the parts are already in a state of considerable irritation, and that it is therefore undesirable to permit any chances of adding to it, of which the presence of a catheter may be one. On the other hand it is urged that the bladder, after long retention, will very soon fill again, that the obstruction may again act as before, and that less hazard is incurred by the presence of the instrument than by a probable repetition of the effort to place it there, the argument receiving additional force if more than ordinary difficulty was experienced in passing it in the first instance. I have no hesitation in coinciding with the latter view, as the rule, reserving the right to make exceptions under peculiar circumstances. Great danger may be incurred by the too early removal of a catheter which had relieved an urgent attack of retention. The indication for tying in is strengthened, if the catheter, which has been introduced with difficulty, is a flexible and not a metallic one, the former being much better tolerated than the latter. In fixing it in its place, it is necessary to be careful that its extremity only just reaches the bladder, and does not project far into it, since the latter position is prone to cause irritation. A plug is fitted to the external orifice, and the water is drawn off from time to time as may be necessary. In some cases, however, it is better, especially when the water is acrid and offensive, to substitute for the plug a piece of light and flexible indiarubber tubing of sufficient length to reach a vessel at some distance, under the bed for example. Or, if it conduces to the patient's comfort, the tube may be used long enough to reach to an adjacent room—a plan I have frequently adopted in private practice, with good results in these conditions, the whole of the excretion passing off as easily into a vessel at 12 feet distance as into one placed in the bed itself. It is only necessary to be careful that the tube is slender and light, and that it is fixed at two or three points in its course, commencing at the side of the patient's bed, so that no weight or traction may be made upon the catheter by it. All this is very easily managed by a little contrivance. The employment of the catheter in this manner is of course to be dispensed with as soon as the patient's condition permits.

The well-known vulcanised india-rubber catheter is in some cases exceedingly valuable. From its extreme softness and flexibility, its presence is scarcely felt by the patient, and it has the remarkable property of rarely acquiring a phosphatic crust even after several days' residence in the bladder. It is by no means always possible to introduce it without a stilet, which, if necessary, is of course to be removed immediately. When the wants to pass water are extremely frequent, and the patient cannot relieve himself at all except by a catheter, one of these may often be most advantageously retained. Owing to its extreme flexibility it is apt to be swept out of the urethra with the urine, and is thus sometimes not easy to retain. Hence Mr. Holt has devised a pair of 'wings' at its vesical extremity, which rather tend to produce irritation. I think a German-silver tube inserted into the stem for about four inches provides a method of easily retaining the catheter by any means which the surgeon is accustomed to employ. There is no better way than that of fastening it with two pieces of cotton bobbin, or very narrow tape, to the hair covering the pubes, as described in my clinical lectures and elsewhere for the treatment of stricture.

There is still another means for stiffening the outer four or five inches of a vulcanised catheter: viz. by giving it two or three coats of collodion, the effect of which is to produce nearly the same condition as that attained by the metal tube.

The next question to be considered is, what is to be done when it is imperatively necessary to afford speedy relief to retention, all attempts by ordinary catheterism having failed.

Such an emergency, although rarely happening, must occasionally present itself. Evidently some form of artificial opening must be made into the bladder; which may be accomplished by perforating the obstructing portion of the prostate; by puncturing the bladder with a trocar from some external part; or with a minute tube, and removing the urine by aspiration. The different operations involved by these proceedings shall be first described, and their applicability to the various phases of prostatic retention discussed hereafter.

Perforation of the obstructing portion of the prostate—in other words, forcible catheterism—once regarded as a legitimate operation, was performed with a strong silver catheter, about No. 9 or 10 in size, of somewhat conical form at its point, rather longer than the ordinary catheter, but not possessing the large curve of the full prostatic instrument. The operator introduces this to the seat of obstruction, and satisfies himself by means of a finger in the rectum that it lies fairly in the urethra, and is engaged in the prostate: he then steadily carries it onward towards the cavity of the bladder, by pressing the point firmly forwards, and at the same time slowly depressing the handle; and he desists on feeling that the point is free in a cavity, and on finding that the urine flows through the instrument. This, according to Chopart, was done by Lafaye on the person of Astruc; in more recent times it has been done in this country by Home[1] and Brodie.[2] Examples of a wound thus made may be seen at the Museum of the Royal College of Surgeons, in preparations there. Liston accomplished the object with a cutting stilet 'carried through a slightly curved and long canula,' and 'practised the operation a few times successfully.'[3] This rough proceeding must now be considered as a matter of history. The improved flexible instruments employed at the present day have rendered any forcible means unnecessary and undesirable, except for very rare cases, in which skilful manipulation has failed. For these, puncture of the bladder from the part most adapted to the circumstances of the patient, or, if temporary relief will suffice, aspiration, which is a much more simple proceeding, may be performed.

Puncture of the bladder is performed in two ways: above the pubes; through the rectum; and it has been done also through the pubic symphysis.

The suprapubic, at one time regarded as the only possible mode of reaching the bladder from the surface in cases of enlarged prostate, is performed as follows:—The patient being placed in a half sitting, half reclining position, and the pubes having been shaved, a vertical incision of the integument is made directly above the symphysis pubis, about an inch and a half in length at the surface; this is to be carried downwards through the linea alba, so as just to admit the tip of the finger to recognise the distended bladder. Meantime an assistant, standing behind the patient, should press one of his hands firmly on either side, against the abdominal walls, in such a position as to steady the bladder. A straight, or a slightly curved, trocar (if the latter, the convexity of the curve should be upwards) is then to be carried, with a very little inclination downwards into the bladder. The puncture should be made, not in a direction dipping down behind the pubes, or, as the bladder contracts, by emptying itself the opening will recede too far below the symphysis: nor should the distance above it exceed an inch, else the peritoneum will be in danger. When vesical distension is considerable, this membrane is carried two inches or more above the margin of the symphysis. After the operation the canula should be exchanged for a silver tube specially adapted to slide through it, secured by tapes and a T-bandage, which may remain a variable length of time, at all events until lymph has been effused upon the edges of the wound, when it may be withdrawn, and a flexible, or elastic-gum, catheter worn in its place, an instrument which is generally better tolerated by the bladder than one made of metal. Or a gum catheter may be passed through the tube, and the latter be withdrawn when the operation has been completed.

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[1] *Practical Observations on the Treatment of the Diseases of the Prostate Gland*, vol. i. p. 163. By E. Home. London, 1811.

[2] *Lectures on the Diseases of the Urinary Organs*, 4th ed. p. 195. By Sir B. C. Brodie. London, 1849.

[3] *Practical Surgery*, 4th ed. p. 845. By Robert Liston. London, 1846.

The puncture by rectum, commonly adopted in stricture, but which may be resorted to in most cases of retention from enlarged prostate, may be performed in the following manner. The rectum having been emptied, if necessary, by means of an enema, the patient is to be placed on his back, in the position for lithotomy, and firmly held by two assistants, not tied. The surgeon is then to introduce the forefinger of his left hand into the bowel, and ascertain the limits of the prostate, defining its boundaries, particularly the posterior one. Fluctuation should be felt there, communicated through the contents of the bladder, from a tap, or from momentary pressure made on the hypogastric region; and the point at which it is most distinctly perceived in the median line selected. Any spot within fair reach of the finger, under the circumstances of retention and consequent distension of the parts, may be considered safe as regards the peritoneum. Having directed an assistant to support firmly the lower part of the abdomen with both hands, so as to press down and steady the bladder towards the rectum, a well-curved trocar, seven or eight inches long, should be carried along the finger, and carefully directed to the part indicated; the handle is then to be depressed, and the point carried upwards through the coats of the rectum and bladder, until it is felt free in the cavity of the latter. The canula is to be carefully kept in its place while the trocar is withdrawn, and afterwards retained there by means of a bandage and tapes. In order to prevent the liability to slip from the bladder, which the ordinary canula is found to exhibit, Mr. Cock, formerly of Guy's Hospital, contrived one, the extremity of which can be made to expand somewhat after its introduction into the bladder, and with which there is therefore less danger of the occurrence of that accident. The form is that of the trocar generally employed, but increased in length and thickness.[1] I have always used Mr. Cock's instrument, and have found the canula well retained.

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[1] *Medico-Chirurgical Transactions*, vol. xxxv. p. 186.

Lastly, the puncture of the bladder through the symphysis pubis may be briefly mentioned.

This operation was first proposed by Dr. J. M. Brander, of Jersey, in 1825, when a student in Paris,[1] and described in a paper at the Royal Medical and Physical Society of Edinburgh, and at the Medical and Physical Society of Calcutta.[2] Several other cases have been reported.

Dr. Brander directs that the patient should recline, and the trocar should be introduced, with or without a small preliminary division of the integuments, about the centre of the symphysis, reckoning from above downwards, and in a direction at about right angles to the vertical axis of the body. Dr. Brander says, 'somewhat obliquely downward and backward toward the sacrum, varying the direction according to circumstances; a piece of flexible catheter is then to be introduced through the canula,' and retained by a tape.

I once tried it in University College Hospital, and failed to find urine, immediately afterwards puncturing by rectum. The symphysis is, in fact, as in the preceding instance, so completely ossified in most elderly men, that the point of the trocar is blunted by the bone, and does not perforate the soft tissues beyond, pushing them before it, and thus the puncture is rendered nugatory. I have observed this on the dead body when making experiments for the purpose, and shall not repeat the procedure on the living.

In reviewing the comparative merits of the two other modes of puncturing the bladder, it must be admitted that each possesses in certain cases some special advantages. Most surgeons have regarded suprapubic puncture as more dangerous than that by rectum, since, although sometimes serving for years after[3] as the only outlet to urine, it was thought liable to occasion some risk of extravasation and suppuration behind the symphysis; but this rarely happens if properly performed. If a somewhat temporary relief only is required, the rectal is the simpler and the safer operation, leaving the suprapubic to be employed only when an enormous prostate forbids the application of the former. But when, on the other hand, it is reasonable to believe that the new opening must be the patient's only resource for a

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[1] *Séances de l'Athénée de Médecine*, 1825.

[2] *Transactions*, 1842, vol. viii. part ii. pp. 208–239. A paper on the subject and one case read December 1839, with a second case in the appendix.

[3] There is a preparation in the Museum of the Royal College of Surgeons of the bladder and prostate of a man aged 66, on whom the operation was done for retention from prostatic enlargement, who lived four years subsequently, resuming his former business habits: No. 2043. The late Mr. Paget, of Leicester, once showed me a patient (1867) who constantly wore a short flexible tube above his pubes, upon whom he performed this operation fifteen years before, and during the whole of this period he evacuated all his urine by means of this tube. He had another patient who had done the same thing for two years; both patients followed their occupations with comfort and regularity.

CHAPTER XIV.

ON THE PERFORMANCE OF OPERATIONS FOR RELIEF OF VERY SEVERE SYMPTOMS RESULTING FROM ADVANCED PROSTATIC DISEASE.

Most cases of Habitual Micturition by Catheter do well—A few suffer greatly as the Hypertrophy advances—Hourly Catheterism sometimes required—A Grave Condition—Operation to relieve the Patient—Suprapubic Puncture, and Tube retained—Method of Performing—A New Method, by opening the Prostatic Urethra from the Perineum—Temporary Withdrawal of Urine by New Route—Rest to the Bladder and Urethra affords Permanent Relief to Severe Symptoms—The Procedure, 'Digital Exploration,' described and recommended.

Although in a large number of cases of hypertrophied prostate the daily use of the catheter is a necessary duty on the part of the patient, and absolutely essential to ensure his comfort, and to prolong his life, the trouble and labour involved by the proceeding are not considerable. After some practice he acquires the habit of using the catheter three times a day, or even five or six times if all natural power to pass urine has been lost, and he employs the instrument with ease and a comfortable sense of security previously unknown. In many instances a long period of suffering from frequent and painful micturition has been endured, before the subject of it learns how much a facility in using the catheter will recompense him for the trouble in attaining it.

In addition to the local relief, the health improves from prolonged rest and sleep, as well as from the cessation of local inflammation. This state of comfort often continues for many years without material change. Numerous cases have been under my care in which a patient who has commenced the habitual use of the catheter at from 57 or 58 years of age, has continued it without difficulty, and without increased troubles of any kind, during a period of from 12 to 20 years—indeed, until life terminates, as it often does, from some cause unconnected with the derangement of the urinary organs. In exceptional instances a much longer term has been passed in comfort in the conditions referred to. I have personally been acquainted with several examples of successful catheterism pursued without severe troubles of any kind during a term of thirty years. One of these patients lived to the age of 90, the others but a few years less.

For some cases, more frequent, but still happily exceptional, a stage of the complaint arrives, by gradual steps, in which the capacity of the bladder is greatly diminished, so that the catheter is necessary from sixteen to twenty-four times, or even more, in the twenty-four hours—a condition of extreme misery for the patient, inasmuch as it entails loss of sleep, much fatigue, and often also increased difficulty in passing the instrument from injury to the urethra by frequent catheterism. At this period, too, the augmented volume of the prostate sometimes makes the canal difficult to traverse alike for the patient and the surgeon; and if a false passage be made by either at this crisis the result is very painful, often dangerous to life.

A patient in these circumstances has reached a position in which he exists for little else than to pass his catheter. No sooner has he obtained a half-hour's relief than he begins to feel the warning of another approaching call to pass urine, and on each occasion he experiences some minutes at least of suffering in his endeavour to sustain as lengthened an interval as possible. His powers are tasked to the utmost, for continuous sleep is out of the question, and health steadily declines. This hourly recurring task and the restricted period of rest which alone can be available for such a patient, constitute together an exceedingly severe test to his powers of endurance. Life itself becomes at length a heavy burden, for equally by night and day, the alternating sufferings produced by the presence of urine which cannot be retained, and by the exertions necessary to obtain relief, must be supported without respite or even the hope of attaining it.

The arrival of this stage, then, is the almost certain prelude of painful death to the patient. Hence the question is forced upon the surgeon, 'Can nothing be done, by any operative measures, for the permanent relief of the unfortunate patient?' And I think it will be admitted that, if these should be somewhat difficult or even be attended with some risk, the gravity of the situation warrants an attempt, if only a moderate chance of materially improving his condition appears to be attainable. We are now advisedly seeking a 'permanent relief,' because a temporary remedy exists for some in the employment of an inlying catheter. To tie in an elastic or indiarubber catheter is an expedient which may avert the fatal result a little in some instances; but it can be only temporary, and it may in others rather tend to aggravate the malady and hasten the end. It is assumed, also, that medicinal agents, including especially opium, have ceased to suffice for the exigencies of the case. The bladder is, indeed, so organically thickened and diminished in capacity that hourly relief has become a physical necessity.

There are two modes of proceeding by which we may, I think, hope to afford to such patients a considerable degree of efficient, and of more or less permanent relief. The first is one I put in practice several years ago with a moderate degree of success, and it will be first described. The second mode is one which I have more recently tried, and on the whole with better results, and this will be considered subsequently.

It is now more than sixteen years ago that I adopted for a patient who was suffering severely in the condition just described, a proceeding similar, indeed, to that which we employ in the trachea when death is intending to make the incision for the tube by merely pushing the trocar from within the bladder outwards to the skin, after which the tube would be inserted and lodged in its place by withdrawal as above. I learned, however, by several experiments on the dead body, that, although this was safe and easy of performance in a distended bladder, the peritoneum might be wounded when the bladder was empty. Hence my abandonment of what seemed a very simple and easy proceeding. The safe course, therefore, is to make a very small opening directly above the symphysis, then to find the way close behind it to the end of the sound there, and incise only just enough to allow this to be pushed up into view. The insertion of the tube into the hollow of the sound, and the withdrawal of the latter, as already stated, brings the tube into its place. But it may be remarked that the urine may not at first flow through it, for the act of withdrawing the sound may carry the tube, not only into the bladder, but, when this is empty or very contracted, even through it into the prostatic urethra. If so, the tube has only to be drawn a little out of the wound, and the urine flows. Indeed, I have found that the tube is usually improved, especially in the subsequent progress of the case, by being somewhat shortened. It is then to be secured in its position with tapes and plaster, and to be worn a few days by the patient in bed until the parts are consolidated, and he can move about with safety. If the tube escapes during the first two or three days, it may not be easy to replace it, but when the passage is established it may be removed and replaced easily enough. A very important injunction is to make the wound as small as possible, so as to be nearly filled by the tube. A large wound is more painful, and is constantly traversed at first by the escaping urine.

In the previous edition of this work I gave the particulars of three cases in which this plan had been pursued with more or less of advantage to the patient in each instance; and I think it unnecessary to repeat these histories. For it is quite certain now that the proceeding is capable of mitigating the sufferings of an aged and infirm patient to whom hourly catheterism is a slow but fatal form of torture. To be useful in the way of prolonging a useful or a fairly comfortable life, the operation should be resorted to at an early period, that is, at least, before the last painful stage has arrived, or has given signs of its near approach.

But the proceeding thus described does not now constitute the only resource within our reach for the relief of these cases. There is another operation which bids fair to be on the whole more useful, and more generally available in most of the instances in which efficient surgical relief is demanded.

Having during the last few years on several occasions been required to make a small perineal opening leading by the prostatic urethra to the bladder, for the purpose of removing a tumour therefrom, to explore with the finger itself for the presence of sacculated calculus, &c., it occurred to me to employ the same incision with another object in view. I thought it was not unlikely that the extreme irritation of the bladder in these advanced cases might be partly due to the repeated catheterism necessary to afford relief imperatively demanded by an inflamed and hypersensitive bladder. The cystitis on the one hand, and the catheterism on the other, exert influences equally unfavourable; the patient becoming the victim of a vicious circle of actions, in which an absolutely indispensable remedy, the catheter, aggravates the inflammation of the bladder, which, in its turn, demands the instrument with increasing frequency. It occurred to me, then, that, were it possible to suspend all action on the part of the bladder for a few days, by withdrawing all the urine by an artificial opening, and so for a time to abolish catheterism altogether, with its irritating effect on the urethra, the inflammation of the bladder might subside, and its tolerance of urine might largely increase. It might be hoped that in this manner an improved condition might result, at all events similar to that which is present in a less aggravated stage of obstruction, when catheterism is not needed more than six or seven times in the twenty-four hours. If, in place of hourly relief by the instrument, an interval of three or four hours could be thus attained, an enormous boon would be conferred on the patient.

Accordingly I seized an early opportunity of making a small opening in the perineum, in the manner hereafter to be described, for a patient aged 60, who was passing the catheter every hour, and whose vital powers were at the lowest ebb from constant suffering and loss of rest; and I placed in the bladder, by the new passage, an indiarubber catheter, so that the urine might flow off continuously into a receptacle as fast as it reached the bladder. The relief was immediate and most remarkable. He enjoyed long refreshing sleep, was unconscious of any pain, while the urine itself, which had been charged with muco-pus and blood, and had been offensive in the highest degree, assumed in the course of a few hours a healthy colour, an acid reaction, and was almost clear. In two or three days the patient regained appetite and digestion, became cheerful, and showed a change for the better which no one had been sanguine enough to anticipate. On the eighth day I removed the catheter from the wound; during the next two days urine issued by that route at intervals of some hours; but the wound, which was very small, rapidly closed, and the catheter was of course again necessary. But the passing of the instrument was now no longer painful, the bladder was not inflamed, and could henceforth contain urine three or four hours without inconvenience, while the patient himself, in less than three weeks from the operation, was enjoying active exercise out of doors, having been before confined to his room in the suffering condition which has been described in general terms above.

In another case, but very similar to that above described, I removed, by the same operation, a small encysted calculus which it was impossible to find by means of the sound, and which had been the cause of long-continued suffering. In another, in which the section was made for constantly recurring very severe and painful paroxysms or spasms, the result was entirely successful in relation to the pain, although the frequent micturition, at first greatly relieved, partially returned in a month or two afterwards. In a recent case I found a cyst near the neck of the bladder, from which I removed seven rounded calculi, each larger than a full-sized pea, but with flattened facets from juxtaposition. In other cases, the cystitis has almost, if not entirely, disappeared after the operation; and although after the wound has healed inability to pass urine has always reappeared, the intervals between each call to do so have been considerably prolonged.

The mode of operating is as follows. The object to be accomplished is the opening of the urethra at about the anterior limit of the prostatic portion, by the simplest and shortest route from the surface of the perineum; making a passage which suffices to admit easily the index-finger and no more. There can be little doubt that a vertical median incision, that is, in the line of the raphé, will fulfil this indication better than any other. In this situation, the prominence formed by the bended knuckles of the operator, while introducing as far as possible the index-finger, lies equidistant between the two nates, and acts directly towards the centre of the bladder. Any incision made right or left of the median line must of necessity lead obliquely to the centre, and be a longer line, because it commences at a point on the external surface more distant from the neck of the bladder than is the raphé of the perineum.

Accordingly I employ the central incision, using a median grooved staff, and a long, straight, narrow-bladed knife, with the back blunt to the point. Having placed the left index-finger in the rectum, the knife may be introduced, edge upwards, about three-quarters of an inch above the anus, with or without a small preliminary incision of the skin (I prefer the former), until the point reaches the staff about the apex of the prostate gland, where it divides the urethra for half an inch or so, and is then drawn out, cutting upwards a little in the act, but so as to avoid any material division of the bulb. The left index-finger is now removed from the rectum, simply wiped on a napkin, and, following by the groove of the staff, slowly passes through the neck of the bladder as the staff is withdrawn. The interior of the bladder should first be explored by making firm pressure above the pubes of the patient, who should be very fully under the influence of anæsthesia, with the right hand, so that every portion of its surface can be examined by the tip of the left index, and the presence of any separate tumour, or of any calculus, &c., can be ascertained. When the exploration has been completed, a large vulcanised indiarubber catheter, say about No. 18 or 20 in size (English scale), or a tube, should be introduced with its extremity just within the bladder. Here it should be retained a few days, according to circumstances, chiefly those which regard the relief and comfort of the patient.

I have now made the section described, for various purposes, many times, and have never met with any amount of bleeding sufficient to cause the slightest anxiety. A moderate division of the bulb made in the middle line is not to be feared as a cause of hæmorrhage, while an incision involving the side of the bulb, and nearer to the entry of its artery, is more prone to bleed freely; another reason for the incision advised. Indeed, the risks, if any, attaching to the proceeding, are exceedingly slight. I have met with only one instance of fatal issue, which occurred in a patient completely worn out, whose consent to the operation was given at a period too late to ensure a successful result. At an earlier period, life would, I believe, have been much prolonged, as well as relief given to suffering; the latter condition having been completely attained, and the last hours of existence rendered painless and tranquil.

As already intimated, as soon as the opening has been made, and the bladder has been examined, an indiarubber catheter is introduced, so that the end lies just within the neck of the bladder, the other end protruding three or four inches or more from the wound, so as to be connected with a vessel, into which all the urine is discharged. The flow of fluid is to be uninterrupted and continuous; the patient lies on his back or side, the tube being made fast by soft string or bobbin to a bandage round the waist. The relief is usually at once very great. Instead of the periodically recurring necessity for exertion and painful catheterism, to restrain the agonising distension which has been occurring probably every hour or less, a long refreshing sleep of several hours is at once experienced.

The term of treatment by the newly-opened passage varies according to the results. From seven to ten days usually suffice, long before which the urine is mostly clear, unmixed with mucus. If the patient is quite comfortable the longer term is desirable; if the tube becomes a source of irritation it should be taken out sooner. The wound then rapidly heals, so that at the expiration of two, or at most four, days more, the catheter must be used by the patient as before. I am compelled to say that no section of this kind, nor of any other that I know of, restores the power of emptying itself naturally, to a bladder which has been long deprived of that power by confirmed hypertrophy of the prostate. I have performed lateral lithotomy for several patients suffering with large calculus and whose bladders had been long completely prevented from acting by hypertrophy of the prostate. In doing so, I have removed considerable masses of tumour, and have also freely divided the prostate itself and neck of the bladder in the hope of overcoming obstruction, but without the slightest beneficial influence in this respect. Cases have been referred to with a different result, but I have never been able to meet with one, nor with any precise details confirming the view that a lithotomy section of any kind has any power to remove the disability referred to, and enable a patient, who has for years depended entirely on the catheter, to do without it afterwards. Neither, indeed, can such a result be expected, since when inability to pass urine has been experienced for a period of some years, the complete removal of the mechanical obstruction, could it be accomplished, would probably not confer the ability to perform an act of micturition. The coats of the bladder become irretrievably atonied in such circumstances, and lose all power to dilate and expand, so as to perform their natural functions.

On the principle, however, of affording rest to the inflamed bladder, I have no hesitation whatever in advising the treatment now described as an efficient means of affording very considerable and more or less persisting relief to the worst of these painful and hitherto intractable cases.

CHAPTER XV.

ATROPHY OF THE PROSTATE.

Pathological signification of Atrophy—Sclerosis—Forms of Atrophy—From exhausting Disease—Senile Atrophy, degree of—Frequency of—Nature—From Mechanical Pressure—From Local Disease in the Prostate—Congenital Atrophy—Symptoms and Treatment.

By Atrophy of the Prostate is to be understood a diminution in the bulk and weight of the organ resulting from a gradual disappearance of some of its constituent structures. Regarding solely the results of this action, it may be considered as the converse of Hypertrophy.

Senile Hypertrophy, however, in its popular signification as applied to the prostate, is not, strictly speaking, the converse of atrophy, since the enlargement of the organ which occurs in the later periods of life is not, as has been already shown, the augmentation of structure due to increased function, analogous, for example, to the augmentation of a muscle by increased use, having no conservative or compensating design and action, *e.g.*, hypertrophy of the heart for the purpose of overcoming the increased resistance offered by a calcified valve, &c. Atrophic change cannot, however, be regarded as resulting from any active pathological influences exerted in the organ itself. It is a passive condition rather, and consists in simple wasting of the organ, in the gradual disappearance of elementary structures.

If true sclerosis affects the prostatic tissue, using the term in a sense which was distinctly defined in Chapter VI. (p. 68), that process may issue in atrophy of the part as a final stage, judging from what takes place in the spinal cord and elsewhere. That any such pathological action does affect the prostate I have no evidence, and I refer to it merely on a supposition that it may occur, having regard solely to the authority of others.

What is the precise physiological action by which simple atrophy is determined? Is it some active process of absorption removing the constructive elements of the prostate in the same manner, but more rapidly, than that ordinary process, which results from the effete tissues throughout the whole body, in order that they may be, as constantly and gradually, replaced by new material? Probably it is rather the result of failing power on the part of the body to replace, by new material, the effete tissues removed by the natural process of absorption. It is not that the process of degradation is much more rapid, but that the powers of supply and re-formation are less vigorous than heretofore.

Atrophy of the prostate thus defined appears as elsewhere, in different circumstances, and may be considered under five heads:—

I. The Atrophy of exhausting general disease.
II. The Atrophy of old age.
III. The Atrophy caused by pressure.
IV. The Atrophy caused by disease in the prostate itself.
V. The Congenital Atrophy.

The first is the Atrophy which occurs from exhausting constitutional disease, particularly in Phthisis. The extent to which atrophic change occurs from this cause is sometimes very remarkable, as I have several times had opportunities of noting. I have recently had occasion to dissect a specimen from a man 21 years of age, who died of phthisis, in whom the organ weighs only 54 grains, or less than 1 drachm. Another example is No. 151, from a man aged 78, who died of phthisis: the prostate weighed only 2 drs. 45 grs. In all cases of this kind there is very considerable wasting of all the structures of the body, and herein this form of atrophy often differs from the second form. But the proportion of diminution affecting the prostate appears to be larger than that suffered by most other organs in the body.

There are other diseases in which the prostate becomes atrophied; all wasting diseases produce this condition to a greater or less extent, but in none is it so marked as in tubercular and scrofulous disease.

In one example, No. 150 of the table of preparations, the prostate of a man aged 90, who died exhausted by carbuncle, the organ weighed 2 drs. 50 grs. In this case all the tissues of the organ seem to be equally affected: one component tissue does not seem to have been diminished in greater proportion than another, judging from the appearances presented on making sections in different parts of the organ.

The second kind of atrophy is that which occurs during old age. A general diminution in weight and bulk of the solids frequently occurs in individuals as they advance in life beyond a certain age. A mere participation in this condition is not what is intended by senile atrophy. A prostate, which is the subject of this affection, is one in which the diminution is relatively greater than that which affects the rest of the body. It has been said, but it appears without sufficient foundation, that when hypertrophy of the prostate is not present in the aged, atrophy will always be found to exist. This statement is certainly not borne out by facts. Thus, by reference to the table in Chapter II., we find no less than fifty individuals at and above the age of 70 years (70 to 94 years), whose prostates ranged in weight between 3¾ and 5½ drachms, a great majority of them being between 4 and 5 drachms, and in whom, therefore, neither hypertrophy nor atrophy could possibly be present. In none of them was there any sign of urinary derangement during life. The number of prostates unaffected is much larger, viz., upwards of ninety, if all the individuals between 60 and 70 years are also reckoned; the higher age was chosen, so as to place beyond a doubt the statement that a normal condition of the prostate is common at very advanced ages.

Among the 164 examples at and above 60 years, 11 only had prostates weighing less than 3½ drachms. Organs weighing upwards of 3½ and under 4 drachms cannot be considered the subjects of senile atrophy from the mere fact of weight; some of them are certainly normal; but details respecting their structure and the size of the individual are data which it is necessary to possess, since, as in other organs, it is not the absolute weight, but, as just observed, that which is relative to the weight of the body, which must be known in order to decide the existence of the degree of atrophy present in a doubtful case. Accepting the number of undoubted examples of atrophy as eleven, and deducting two as occurring in individuals who died of exhausting disease (phthisis and carbuncle), there remained nine which may be classified here. Consequently, on this calculation, senile atrophy occurs in rather more than 5½ per cent. of individuals at and over 60 years of age. After all, the result of the inquiry has no practical bearing; nevertheless, possessing the materials, it was desirable to eliminate it, as not altogether without interest.

Senile atrophy, that is, the atrophy which has its origin not in exhausting disease, but occurs independently in a few elderly subjects, is of a somewhat different character, histologically regarded, from the atrophy of exhausting disease. In the latter, all the constituent tissues are about equally diminished, so far as dissection enables us to judge. In senile atrophy, on the other hand, the glandular element is in smaller proportion to the fibro-muscular or stromal than in the healthy organ. The fibrous is often hard and tough, and may even have some small tumours of the same material existing in it. This form of atrophy is, perhaps, less extreme in its degree than that of exhausting disease. In the case of an adult who died from phthisis, the prostate weighed only 54 grains; but in no instance of senile atrophy was there one weighing less than two drachms and a few grains.

The third form of atrophy is that produced by mechanical pressure. No peculiarity can be affirmed to characterise this form of atrophy. It is that species of diminution, of disappearance of elementary constituents, which is observed in all the tissues of the body under the influence of continued mechanical pressure. Thus the prostate is sometimes observed to be very considerably diminished in weight and volume from the action of pressure exerted by adjacent tumours, which may have fluid contents, as abscess and hydatid; or by bony and other solid tumours; by calculi in the bladder or embedded in the prostate itself. Not unfrequently, also, from long-continued and extreme distension of the bladder with urine, and of the prostatic urethra itself, when very confirmed stricture exists, a considerable pressure is sometimes exerted, which in like manner seems to result in marked atrophy of the prostate. In these cases the structures are sometimes thinned to a very considerable degree, the natural ducts and cavities are dilated, and nearly one-half of the organ, estimating it by weight, may disappear in the course of long-standing and unrelieved stricture of the urethra.

The fourth form of atrophy is that produced by some local diseases of the prostate itself. Abscess in the prostate will produce disintegration of a considerable portion of the prostatic tissue by impairing the local nutritious supply of the adjacent structures through the agency both of ulceration and pressure; and thus atrophy may be said to occur. A deposit of tubercle will produce similar consequences, and sometimes to a considerable extent. In like manner, malignant disease will cause the proper structure of the prostate to disappear, superseding it by its own morbid growth; and in this sense also the prostate has been said to be atrophied.

The fifth is congenital atrophy.—The prostate is sometimes found in a condition at birth, in which it may be said never to have been naturally developed—a condition usually associated with congenital malformation of other portions of the genito-urinary apparatus—in extroversion of the bladder for example; and it is due rather to want of development, strictly speaking, than to atrophy. No further notice of it therefore will appear here.

Symptoms and Treatment.—It is not known that simple uncomplicated atrophy of the prostate declares itself by any signs or symptoms. Neither is it conceivable that it should do so, except by the diminution in size ascertainable by rectal examination and by diminished secretion. As regards the latter, we know so little of its specific amount in health, that no conclusions can be adopted respecting the change which atrophy produces. Probably it is associated with a decline of the sexual powers in age. Neither does the condition demand any notice in relation to treatment. There is no reason to believe that we possess any means of restoring an organ affected with senile atrophy. When atrophy results from other causes, such as stricture, abscess, &c., their alleviation or removal will doubtless be a means, and the only means, of beneficially affecting the prostatic affection.

CHAPTER XVI.

CANCER OF THE PROSTATE.

A Rare Affection, but probably less so than generally supposed—Why it is so—Analysis of Tanchou's Tables—Malignant Disease of Prostate almost invariably Encephaloid—A few Cases of Scirrhus—One of Colloid—Melanotic Deposit—Soft Sarcoma—Ages at which Carcinoma appears—Duration—Course—Morbid Anatomy—Symptoms—Hæmorrhage—The Urine—Treatment—Tabular View of Twenty-three Cases.

THE prostate may be the subject of cancer either as its primary seat, or when secondarily implicated after the primary appearance of the disease in some other part of the body. In either case prostatic cancer is a rare affection. It is a question, however, whether its rarity has not been in some respects exaggerated, judging from the general impression which appears to prevail respecting it. I am inclined to believe that a certain small proportion of instances is lost sight of among the very large number of cases assigned to senile hypertrophy. The course of malignant disease when well marked, it is impossible, with ordinary care, not to diagnose from the last-named affection; but when carcinoma assumes a more chronic form than usual, and especially when it arises in a prostate previously the subject of senile enlargement, the malign character is sometimes, perhaps, overlooked. A good example of the coexistence of the two affections, which occurred under my own care, occurs in the table of cases at the close of this chapter. The case was presented to the Pathological Society in 1854.[1]

In reference to this question of frequency, the statistical researches of M. Tanchou are commonly quoted by writers on this subject, and in the form comprised in the following statement. Among 8,289 fatal cases of cancer, he met with only five affecting the prostate. It will be desirable, however, to examine these figures further, since they are calculated to produce an incorrect impression respecting the fact. The manner in which the data in question and the statistical summary were arrived at is as follows:—M. Tanchou made an abstract from the registers of deaths for Paris and its suburbs, of every case in which the fatal result was attributed to cancer, during the years 1830 to 1840 inclusive; reporting what was believed to be the primary seat of disease in each case, naming one organ only, and classifying the whole accordingly, with a view, among other objects, to form a numerical estimate of the primary seats of malignant disease throughout the body. The total number comprised 6,957 females and 2,161 males—9,118. In 829 cases, the seat of disease was not originally reported, leaving 8,289 cases. Of these 1,904 were males, and among these the disease was recognised as a primary lesion, five times in the prostate, and all in adults.[1] But 72 cases are given of cancer of *the bladder* without distinction of sex. As a primary lesion, it appears to be more frequent in the male than in the female. In the latter sex vesical cancer is almost invariably due to extension from a uterine growth. Supposing, then, that fully, or more than, one-half of these may be claimed for the male sex, it is not unreasonable to suppose that some of them may have been prostatic in their origin. A fully developed prostatic encephaloid cancer soon becomes vesical, and may often not be distinguishable except by careful examination. Thus, in several instances I have seen the bladder almost filled by a tumour which, nevertheless, had its origin in the prostate.

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[1] *Path. Trans.* vol. v. p. 249.

Regarding the source from which Tanchou's figures were derived, viz., from an ordinary register of deaths, for the purposes of which no special examination is required, it is almost certain that error of the kind just named must have vitiated the result in relation to this question. And we are entitled, I think, to believe that the proportion of five cases of primary disease in the prostate, out of 1,904 male cases of cancer, is very much smaller than the true number.

The occurrence of secondary is more rare than that of primary cancer in the prostate. It has most commonly been observed that the invasion has then taken place by extension from the bladder. I have, once only, seen it succeed encephaloid cancer of the penis, itself a very rare affection.

The form of carcinomatous disease which most commonly affects the prostate is probably encephaloid. In children no other form is met with, while in adults any other is extremely rare: indeed the occurrence of scirrhus has been denied. After a close examination of all the cases reported, the opinion expressed by Dr. Walshe in 1846, after a careful examination of the subject, although dealing with necessarily fewer data than we now possess, was that 'the evidence of the occurrence of true scirrhus of the prostate is defective.'[2]

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[1] *Recherches sur le Traitement Médical des Tumeurs Cancéreuses du Sein* pp. 256-261. Par S. Tanchou. Paris, 1844.

[2] *The Nature and Treatment of Cancer*, p. 414. By W. H. Walshe, Professor of Medicine in University College. London, 1846.

I have carefully collected from the most trustworthy sources, where details were given by competent observers, 23 cases of primary malignant disease in the prostate, arranging them and the chief particulars concerning them at the end of this chapter. In reference to this inquiry it is necessary to remark that cases have been formerly reported as scirrhus which cannot be so accepted, although regarded as examples by former writers on the subject. That scirrhus of the prostate does occur, although it is exceedingly rare, there can be no doubt, but this fact renders minute details recorded by competent observers essential as evidence. Moreover, it is necessary to bear in mind that, among the older authors, the term scirrhus has been used with the intention of implying merely the presence of an indurated structure. The precision of meaning which modern pathology has assigned to it must not, therefore, be understood when referring to their records.[1]

At a much later period one case of scirrhus was recorded by a competent observer, Mr. John Adams, of the London Hospital, who gives the following account of the case:—A gentleman, the subject of urinary derangement for the first time at 59 years of age, died three years afterwards from the advance of the complaint. At the post-mortem, the lumbar and iliac glands were affected with scirrhus, 'the prostate gland was enlarged to nearly twice its natural size; an ovoid mass, distinctly scirrhous, the size of a small nut, projected into the bladder from the upper surface. The left lobe was occupied by a long scirrhous mass; the right lobe appeared healthy.' Mr. Adams further added, that 'the tumour had been examined by an experienced microscopist, who had pronounced it to be true scirrhus in every particular.'[2] (See case No. 3, in the table, page 191.)

Since the occurrence of that case I have myself once verified the existence of scirrhus affecting the prostate, and have met with two other cases on the authority of trustworthy observers.

Mr. Boyd, of University College, has also reported a case of colloid disease, for the first time noted in the prostate, in a man aged 55 years.[3] The extreme rarity of such affections of the organ is therefore now fully demonstrated.

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[1] Two cases used to be formerly cited as examples of true scirrhus in the prostate. The only fact reported respecting them was the extreme hardness of the structure, conjoined in one patient, aged 70, with the presence of advanced encephaloid disease in the abdomen. See a paper by Mr. Howship in the *Med.-Chir. Trans.* vol. xix. p. 35.

The other is reported as an example to illustrate a paper 'On Local Diseases termed Malignant,' by Baig Travers, *Med.-Chir. Trans.* vol. xvii. p. 346. The only record respecting it is as follows:—'I found the prostate occupied by a tubercle, possessing all the characters of scirrhus, upon section, in an old nobleman, long subject to retention.' The evidence in regard of these cases is therefore insufficient.

[2] Report of the Meeting of the Royal Med. and Chir. Soc., April 12, 1853.—*Lancet*, 1853, vol. i.

[3] *British Medical Journal*, April 15, 1882.

Melanotic deposit is said to be occasionally found associated with encephaloid of the prostate. Its presence is reported in two cases, one at adult age, the other in childhood. It should not be forgotten, in the examination of these cases, that interstitially effused blood in a fungous growth may be mistaken for true melanotic deposit, which to the naked eye it sometimes resembles.

Regarding the last and least malignant form of carcinomatous disease, epithelioma, there is no example yet known of its occurrence in the prostate.

It is only within a comparatively recent period that the presence of soft sarcoma has been verified, by competent observers, in the prostate. Two such cases are reported in the table referred to. It is, however, no doubt rare, as it is in the bladder itself, as a primary deposit. But it is by no means improbable that among the several cases formerly regarded as examples of encephaloid carcinoma, an occasional instance of soft sarcoma may have been included.

Malignant disease has at present been observed chiefly in childhood and at advancing age. Only three authenticated cases are on record between the ages of 8 and 40. The duration of the disease, from the first appearance of symptoms to the fatal result, appears to vary from one to five years in adults, and from three to nine months in children. It should not be forgotten that encephaloid deposit may sometimes take place in a prostate previously hypertrophied, and already the cause of obvious symptoms of urinary obstruction. In such a case it is clear that the period which elapses between the first appearance of urinary difficulties and the fatal termination, is not to be regarded as the duration of the malignant disease. This condition is not easy to verify during life, and is happily exceedingly rare; still it may not be overlooked that the coexistence of the two conditions is possible.

In referring to the table of cases, it may be observed that in childhood the encephaloid deposit was limited to the single organ, or to it and to the adjacent lymphatics, although the latter has not been positively reported, and that it ran a very rapid course. Whereas in the adult cases the development of disease was slower, and other viscera were usually affected besides the prostate. These facts harmonise with those presented by the course of encephaloid generally. Always progressing rapidly, its growth seems active in proportion to the youth of the individual. On the other hand, the appearance of the deposit in several organs, observed in adult age, may, perhaps, be regarded as an effect of the slower rate of progress manifested by the disease affording time for numerous local developments to occur.

Morbid Anatomy.—Little can be positively affirmed respecting the morbid anatomy of carcinomatous disease in its early stage in the adult subject. Anatomical examination can very rarely be applied to any specimen which has not already arrived at a late period of its fatal course, the death of the patient having been almost invariably caused by the disease in an advanced stage. There is reason to believe, judging by inferences drawn from rectal examination of these cases in the earlier stages, some months before death, that a deposit takes place at one point, from which, as from a centre, the disease extends; this point being usually in one of the lateral lobes. In the first stage, probably, the smallest amount of active increase is displayed; but after the swelling has reached a certain size it rapidly enlarges, and often a very considerable mass is formed before, through the death of the patient, it can become amenable to anatomical analysis.

The conditions then commonly found are as follow:—The prostatic mass is of irregular form: portions project from different aspects of the organ, usually from its upper and posterior ones, and direct their course into the cavity of the bladder. These are of very unequal consistence; some parts are hard and dense, appearing to be firmly bound by the enveloping capsule; but the most projecting parts are often soft and sprouting, as encephaloid of rapid growth is observed to be in other parts of the body. The colour varies: usually brown and reddish tints prevail, apparently produced by great vascularity, or by internal hæmorrhage, the latter being sometimes more clearly evidenced by the existence of dark blood-clots, enveloped by the mass and disclosed by making sections. Some portions are becoming gangrenous, and manifest grey and slaty tints, especially in the urethral mucous membrane. On making incisions into the tumour, if in the later stage, examination often shows that most of the prostatic structure has disappeared before the invading action of the cancerous product. The most recent portions of the growth are seen to be soft to the touch, slightly jelly-like, opaline, faintly transmitting light, and of a pale buff tint, almost white; others are yellowish, and some reddish up to deep blackish-red. Some parts are seen to be softened, pulpy, and disintegrated; from some a creamy juice exudes—from others sanious fluid, or fluid containing flaky masses of dead structure, and here and there are found small collections of purulent matter.

On searching carefully for prostatic structure among the deeper parts (in the sprouting fungus of course there is none), to discover the confines of the morbid growth where it runs insensibly into still remaining portions of the organ, it may be inferred that the gland structures are first involved in the disease, and that the stroma is less readily invaded; the pale muscular fibres appearing to continue free from cancerous deposit to a later period than the gland-follicles. Occasionally, but rarely, the prostate is affected rather by a general in- ration of all the parts than by a distinct localisation of the growth as a tumour; in one such case examined, the condition of the stroma just alluded to was well marked.

mucous membrane of the urethra is generally not entire;

beneath its surface nodules of the diseased growth may be seen, of which one or more have perhaps penetrated, and are commencing to form a fungous growth; and around these nodules there is an arborescent arrangement of minute blood-vessels.

In some examples there is no outburst of fungus from any part of the organ, the disease being contained within its limits, albeit these are greatly extended. In other instances this is far from being the case; the capsule gives way, there is not only fungous growth, but ulceration or even cavity, from which diseased structure has been thrown off, and from which hæmorrhage also has probably taken place from opened blood-vessels.

Under the mucous lining of the bladder adjacent there are also, sometimes, several nodules of cancerous disease; and finally, if the prostatic affection is advanced, the neighbouring lymphatic vessels and glands are always diseased. Even the veins of the prostate have been seen to contain cancerous matter.

Such are the appearances observed in cases of encephaloid affecting the adult. In the child, encephaloid of the prostate attains a larger size as compared with the bulk of the individual. Here we witness all the results of more rapid formation—a softer structure, more succulent and juicy, of brighter tints; often more vascular. Otherwise the general characters in the adult and in the child are the same.

Symptoms.—The symptoms of the malignant affection are those common to prostatic obstruction of any form, but generally declaring themselves with greater rapidity than in cases of senile hypertrophy. These symptoms need not be repeated here. But besides them, there are distinctive characters, such as more severe pain, often very intense; occasional, often frequent, hæmorrhages; and more or less constitutional cachexia. The pain is felt in the rectum, or in the region of the sacrum, and shooting down the thighs, either the anterior or posterior aspect. In one case of my own, recorded here (No. 9), the suffering experienced during the early and middle term of the complaint was very slight, apart from that produced by retention of urine, which occasionally happened, and was relieved by the catheter. During the last few months of his life the patient lost the powers of sensation and motion in the lower half of his body from encephaloid deposit in the upper part of the spinal column; otherwise doubtless his sufferings might have been severe. The prostate is not invariably tender to the touch in these cases, at least not notably so; an observation which is supported by the foregoing instance, before the paralysis supervened; and especially by another case very carefully watched by my friend Dr. Armitage, to whom I am indebted for the history forming Case No. 10 in the table.

Hæmorrhage is a common occurrence both at an early and late period in the course of the disease, being almost universally present at one time or another, and sometimes to an alarming extent. The blood is usually voided almost pure or unmixed, and frequently appears with or after some attempt to urinate, which, from some circumstance, has been attended with greater exertion than usual. Much less commonly is the hæmorrhage observed to be continuous for any length of time, or constantly communicating a bloody tint to the urine, as happens with some tumours of the bladder; unless, indeed, that organ should also be implicated, or the disease have assumed the form of a fungoid growth into its cavity. Nor is the urine so liable to be mixed with pus or mucus as in the vesical affection.

The enlargement formed by the prostate itself, when examined by the rectum, is always hard at first, and may or may not be irregular in outline or consistence, although it becomes so in course of time. Softening may in the later stages be felt, but the patient's powers do not always sustain him to so late a period as that in which the growth either softens or fungates. The deposit may be ascertained to affect the whole organ, and most commonly does so, but it may affect one portion more than another. Generally in adults other organs are affected, but by no means invariably. But there are always diseased lymphatic glands adjacent, and sometimes the infection reaches more distant groups. The existence of such swellings in the course of the iliac vessels, and sometimes in the inguinal region, may frequently be verified by examination of the abdomen, and constitutes a valuable sign in relation to the diagnosis, and, consequently, to the prognosis of the case.

The urine should be closely examined, in cases of a doubtful nature, for elements which evidently indicate the presence of malignant growth. In advanced cases a good deal of *débris* is thrown off. But in earlier stages, if the search is repeated, and especially if the bladder is washed out with warm water, small portions of semi-transparent tissue are generally detached, sooner or later in the history of the case. These should be unravelled and placed under the microscope, when they will probably disclose a cell-structure about which little doubt can be entertained, or which will at all events strengthen other evidence as to the nature of the tumour. The persistence and constant characters of the matters examined should be verified, as error may arise from mistaking the varied and abundant epithelium cells which the urinary passages afford for those of morbid growth.

Regarding the treatment of malignant disease of the prostate, nothing more can be offered here in relation to the constitutional affection than applies to it when occurring in any other part of the body. The treatment is palliative, and must be regulated according to the various necessities which may arise in the progress of the case.

Thus accumulation of urine in the bladder must be provided against at the smallest risk of irritating, much less of injuring, the part. If

TABLE OF TWENTY-THREE CASES OF MALIGNANT DISEASE OF THE PROSTATE

Case No.	Reporter's Name	Age	Duration	Condition of Prostate and Nature of Growth	Condition of other Organs	Source whence obtained
				ADULTS.		
1	Mr. Langstaff	68	5 years	Encephaloid	Lungs and liver	*Trans. Med.-Chir.* vol. viii. 1817, p. 279
2	Ditto	45	5 „	Ditto, with matter resembling melanotic deposit	Lymphatics and vessels adjacent; stomach also	Catalogue of his museum, London, 1842, p. 352
3	Mr. Adams	59	3½ „	Reported scirrhus	Adjacent lymphatics only	Adams *On the Prostate*, 2nd ed. p. 149
4	Mr. Cock	67	Not stated	Probably encephaloid	Adjacent lymphatics	*Idem*, pp. 147–9
5	Sir Wm. Fergusson	75	4 years	Encephaloid	Both kidneys	*Lancet*, 1853, vol. i. p. 473
6	Mr. H. Walton	59	¾ year	Ditto	Adjacent lymphatics	*Path. Trans.* vol. ii. p. 287
7	Mr. Simon	41	Some months	Ditto	Ditto	Lecture, Simon, *Lancet*, 1850, vol i. p. 291
8	Ditto	63	Rather more than 3 years	Ditto	Ditto	Ditto
9	Sir Henry Thompson	60	2 years	Ditto	Spine and adjacent lymphatics	*Path. Trans.* vol. v., 1854, p. 204
10	Dr. Armitage	65	About 2 years	A large mass of carcinoma	Neighbouring part of bladder and inguinal glands largely affected	*Idem*, vol. viii., 1857, p. 281
11	Dr. Dickinson	70	3 or four years	A large encephaloid mass	Adjacent part of bladder and lumbar glands largely affected	*Idem*, vol. xvi., 1865, p. 190
12	Mr. Croft	42	Some months	Anterior part chiefly affected by a dense cancerous tumour, probably scirrhus	Bladder partially involved; glands not much altered	*Idem*, vol. xix., 1868, p. 285
13	Dr. Coupland	19	A few months	Formed a very large tumour, encephaloid, nearly filling the pelvis	Base of the bladder involved. Lumbar and pelvic glands greatly enlarged, forming cancerous tumours. Slight secondary growth in the pleura	*Idem*, vol. xxviii., 1877, p. 185
14	Ditto	29	A few months	Formed a large ovoidal tumour; probably a round-celled sarcoma	The base of the bladder. No affection of the glands	*Idem*, vol. xxviii., 1877, p. 179, with drawing of structure
15	Mr. Stanley Boyd	59	Probably about 9 months	Prostate very large, infiltrated by new growth looking like small beads of gelatine in a fibrous stroma. Colloid cancer	Bladder much involved; other organs not examined	*Idem*, vol. xxxiii., 1882, p. 200
16	Dr. Samuel West	21	History imperfect, but certainly a brief one	Formed a large, soft tumour, no doubt a soft sarcoma	Base of bladder involved in tumour. No secondary deposits	*Idem*, vol. xxxiv., 1883, p. 145
17	Dr. Silcock	61	A few months	A large tumour, evidently carcinoma	Pelvic and lumbar glands affected; other deposits in the temporal bone and left femur	*Idem*, vol. xxxv., 1884, p. 244
				CHILDREN.		
18	Mr. Stafford	5	Few months	Encephaloid and melanotic	No other viscera	*Trans. Med.-Chir.* vol. xxii. p. 218
19	Mr. Langstaff	8	'A considerable length of time'	Encephaloid	In liver also	Catalogue of his museum, London, 1842, p. 357
20	Mr. Adams	3	Not stated	Ditto	Not stated	Adams *On the Prostate*, 2nd ed., 1853, p. 145
21	Prof. Bush	3	7 months	Ditto	Ditto	Gross *On Urinary Organs*, 2nd ed. p. 719
22	Mr. Solly	3	3 months	Ditto	Other organs not examined	*Path. Trans.* 1851, p. 130
23	Mr. Bree	9ms	About 3 months	Ditto	'Viscera generally healthy'	*Provin. Med. & Surg. Journ.*, 1846, p. 76

⁂ Other cases of malignant disease of the prostate are reported in the journals and elsewhere, but are excluded for want of sufficient particulars by which to form a fair conclusion respecting them. At least fifty examples might have been collected, had care not been taken to reject those in which the evidence was incomplete.

catheterism can be dispensed with altogether, so much the better. In no circumstances is it of more importance to be extremely gentle in the manipulation of instruments. The pain must be relieved by anodynes administered by mouth, subcutaneous injection, or by rectum, in sufficient quantity to afford ease to the patient. This point deserves attention: the last few weeks or months of a patient's career, when affected by cancer, are for him an almost interminable period of severe suffering, ceaseless watchfulness and restlessness, from want of sleep; a terrible existence which he would often gladly terminate. These conditions can be greatly ameliorated by administering opium in some form, the best to be discovered by the medical attendant, after trial of various preparations in some exceptional cases. No doubt the subcutaneous injection of morphia is generally the most efficient and the most manageable. It should be freely supplied, and an increasing quantity permitted, as the effect diminishes. The greatest kindness we can now bestow is the mitigation of suffering, and it is always to be accomplished. The effect of opium on the bowels is to be guarded against by the necessary aperients, enemata, &c. Hæmorrhage must be treated on principles already fully illustrated in a preceding chapter (page 142). The powers of life are to be supported, if only to prevent the painful sense of exhaustion. Nutritious food, both in the solid and fluid form, with some alcoholic stimulant if desired, must be supplied in accordance with the digestive powers of the patient.

CHAPTER XVII.

TUBERCULAR DISEASE OF THE PROSTATE.

TUBERCLE—Rare in Prostate; almost invariably associated with Tuberculous Kidney or Testicle—Morbid Anatomy—Symptoms—Diagnosis—The 'Tubercle-bacillus'—Treatment—Tabular View of eighteen Cases.

Tubercle of the Prostate.—The prostate is very rarely the seat of the tubercular deposit, and when it is so, appears generally to be somewhat increased in size, until the later stages of the complaint are reached, when, after suppuration and discharge, its volume may become smaller than natural.

It would appear that at no period of the disease is the prostate affected alone, some other part of the genito-urinary tract being the primary seat of the affection. In most cases the deposit appears to take place first in the kidney, or, at all events, to be present there in an early stage. The organ next in order of liability to the disease, among the genito-urinary group, is the testicle. Thus in eighteen cases collected by myself, and forming a table at the end of this chapter, in which the results of post-mortem inspections have been recorded, tuberculosis of the kidney is reported in thirteen, and of the testicle in seven. The state of the lungs has, I suspect, not always been recorded, but in ten of these cases they are stated to have been diseased.

Morbid Anatomy.—The form which the deposited tubercle assumes in the prostate is, at first, that of minute greyish and grey-yellow points, like millet seeds. These become larger, and numerous rounded collections of cheesy or curd-like consistence may be found, distributed throughout the substance of the organ. The processes of deposition and aggregation continue until the mass may reach the size of a chestnut; commonly, not larger than that of a full-sized marble. It is then generally surrounded by a thin limiting fibrous membrane, being isolated by it from the surrounding prostatic tissue. Among this mass may be found portions of thin cellular tissue intermingling, the remains, probably, of prostatic structures, which have given way before the accumulating tubercle. Central softening takes place in the small greyish-yellow deposits at an earlier or later period; and if the patient survives, discharge of the detritus takes place by urethra. A space remains; and several such coalesce and form a cavity of larger size; pus is formed from the lining membrane, and a considerable portion of the prostatic substance is destroyed. But there is no reason to suppose, when such cavities are found in the prostate after death, that their origin has been tuberculous, unless the presence of such action or deposit can be distinctly verified in some other part of the urinary or genital organs, as in the vesiculæ seminales, the testicles, or in the mucous membrane of the bladder.

Tubercular deposit appears to be more prone to affect the outer than the central parts of the prostate, occurring in the lateral lobes chiefly. By microscopic examination it may be inferred to commence in the glandular structures of the organ, and not in the fibrous stroma.

Symptoms.—From all these circumstances it follows that there are no symptoms which are, strictly speaking, proper to this affection of the prostate. Marked frequency and pain in making water, the frequent occurrence of small quantities of blood appearing at the end of micturition, and at times the signs of cystitis, are experienced. Pains in the back and pelvis, and in the region of the bladder and urethra, are complained of; while loss of flesh and marked debility are invariably manifested sooner or later. The local complaint is to be regarded but as a part of the development of tubercular disease existing in other portions of the genito-urinary organs besides the prostate, and generally in other regions of the body also.

It is no part of the design of this work to consider the symptoms and diagnosis of tuberculous kidney; a subject, nevertheless, of great interest to the surgeon, to whom the disease is perhaps quite as often presented as to the physician, on account of the increased frequency of passing water, and other symptoms resembling those of stone or of stricture. The presence of pus in the urine, of occasional hæmaturia, of pains in the loins, perineum, and penis, gives rise to a suspicion of calculus, to be resolved sometimes only by careful sounding. The state of nutrition of the patient, his history, and the condition of the lungs, are among the main points to be considered in connection with the urinary derangements, which have probably more especially attracted his attention.

It has been affirmed that the presence of tubercular disease in the urinary organs may be diagnosed from the presence of the 'tubercle-bacillus' of Koch in the urine.

Granting the bacillus of Koch to be indubitable proof of the presence of tubercle, it still may not necessarily possess much practical value as a diagnostic sign in tubercular disease of the urinary organs. It is admitted that the appearance of the bacillus in the sputa of a phthisical patient is not to be expected until the tubercular deposit has made its way through the free surfaces of the organs in which it is situated; and then bacilli are discharged, and may be identified. Hence it is not until tubercular disease has been largely developed in the urinary tract that bacilli can be met with: and often not until physical signs of the deposit are present in the testicle, cord, or prostate. But the urine itself is so commonly the nidus of bacteria in variety, that the difficulty in distinguishing an organic witness of this kind, adequate to determine the presence of tuberculosis of the organs, must be very considerable. We must conclude, then, that further careful and patient research will be necessary before decisive views can be accepted, in reference to this subject.

Treatment.—Nothing need be said of the constitutional treatment of tubercular disease, and little in relation to the local manifestation in the prostate. Mechanical interference is to be avoided, and every kind of irritating application. If suppuration takes the form of external abscess, it must be treated as other perineal or ischio-rectal abscesses. But more commonly the discharge of purulent and tubercular matter takes place into the urethra. The improvement of the health, by all those numerous means which regulation of the diet, regimen, exercise, climate, and medicine enable us commonly to achieve in tubercular patients, constitutes almost the whole of the treatment to be employed in the affection, when involving the urinary or genital organs. The diagnosis once established, it is of great importance that the patient should be kept free from all instrumental treatment, which, in such cases, provokes irritation, and aggravates the disease, without conferring upon him any benefit whatever.

Tubercle of the prostate is a very rare affection. It is extremely uncommon to meet with it in the deadhouse. The preserved examples are few. There is no preparation of it in the Royal College of Surgeons, London, although there are one or two specimens of abscesses in the prostate, which are supposed to be of a scrofulous character or origin. There are two examples in the Museum of St. Bartholomew's Hospital, one in Guy's, one in St. George's, one in that of the College of Surgeons, Edinburgh, and one in a small collection at the Royal Naval Hospital, Greenwich.

CASES OF TUBERCLE IN THE PROSTATE.

Patient's Case	Reported by	Age	Condition of Prostate	Condition of other Organs
1	Mr. Lloyd . .	23	Enlarged cavity containing an ounce of scrofulous matter	'The bladder and kidneys were tolerably healthy;' tuberculous cavities in the lungs
2	Mr. Adams . .	26	Disappeared by suppuration .	Tubercle in left kidney, ureter, and testicle
3	Mr. Hudson . .	—	Several small points of softened tubercle, and superficial ulceration	Kidney largely tuberculous; ureter, lungs, bones, lymphatic glands
4	Dr. Basham . .	29	Granular deposits . . .	Right kidney and bladder chiefly affected
5	Dr. Gross . .	27	Eight small masses, each about the size of a pea	One kidney, ureter, and vesicula seminalis; spine and lymphatic glands (not in lungs)
6	Vidal de Cassis .	19	Tuberculous cavity. . .	Testicles and vesicula semin.; brain and lungs
7	Ditto . . .	50	Large tuberculous masses .	Kidneys, lungs, &c.
8	Lallemand . .	55	Thirty small abscesses and tubercles	Both kidneys
9	Ricord . . .	58	Large abscess in prostate .	Miliary tubercles throughout ureter; testicle previously removed for tubercular disease
10	Guy's Hospital Museum	23	Tubercular deposits, 'size of pin's head to that of a nut'	Ulceration of bladder; much congestion of kidneys; tubercle in both lungs, and in lumbar vertebræ
11	Bartholomew's Museum	Young man	Small circumscribed masses .	Tubercle in kidneys, lungs, and other organs; bladder ulcerated
12	Ditto . . .	Ditto	Large mass of tubercles in *left* lobe of prostate	Tubercle in *left* kidney, *left* testicle; in lungs and other organs
13	St. George's Hospital Museum	35	Large tubercular cavity in prostate, capable of holding two ounces	Kidneys extensively diseased; scrofulous abscesses in testicle, secondary to the prostate symptoms
14	College of Surgeons, Edinburgh	11	Prostate destroyed by ulceration	Abscess in perineum; ulceration of right ureter; both kidneys full of tuberculous matter
15	Royal Naval Hospital, Greenwich	76	Large masses of tubercle deposited in outer portions of the organ	Tubercle deposited in mucous membrane of bladder; in vesic. sem., in right kidney, and in lungs
16	—	32	Large deposits of tubercle in the prostate	Tubercular meningitis; tubercle of lungs and mesenteric glands; in the testicle
17	Dr. Guerlain . .	43	Large mass of tubercle in left lobe; smaller ones in right	Tubercle of the lungs; and in bone
18	Mr. Simon mentions a case in which the entire genito-urinary tract was more or less affected with tubercular deposit, from the testicle to the prostate, and from the kidney to the same point.			

1. Lloyd on *Scrofula*, p. 110, 1821.
2. Adams on the *Prostate*, 2nd ed. p. 127.
3. *Trans. Path. Soc.* vol. i. p. 120.
4. *Lancet*, 1855, vol. ii. p. 542.
5. *Urinary Organs*, 2nd ed. p. 721.
6. *Annales de Chirurgie*, 1845.
7. *L'Union Médicale*, 1850.
8. *Des Pertes Séminales*, 1836, vol. i.
9. *L'Union Médicale*, 1849.
10. Guy's Hospital Museum, No. 2393, 75.

11 & 12. Bartholomew's Museum. Series xxix., 19 & 20.

13. St. George's Hospital Museum. Series x.
14. *Catalogue*, p. 260.
15. *Med.-Chir. Trans.* vol. xliii. p. 157.
16. *Recueil de Mém. de Méd. et de Chir.* &c., 1860.
17. *Bull. de la Soc. Anat.* 1860, p. 133.
18. *Lancet*, vol. i. 1850, p. 290.

The preceding cases, eighteen in number, have been condensed into a tabular form. They constitute the greater portion of the data on which our knowledge of this disease is founded. The age of the patient, the condition of the prostate itself, and that of other organs of the body also tuberculous, are presented. The sources from which they are obtained are also added in a note.

CHAPTER XVIII.

CYSTS, OR CAVITIES IN THE PROSTATE.

True Cysts unknown—Cavities are of three kinds—Dilated Follicles; Purulent Depôts; and containing Concretions—Hydatid Cysts between the Prostate and the Rectum.

SMALL cavities, which have received from many authors the name of cysts, are frequently to be seen in the prostate, especially in those of aged subjects.

If by the term 'cyst' it is designed to describe a thin-walled, cell-like body or closed sac, spheroidal, or nearly so, in form, containing fluid, a structure of new formation apparently, not a mere dilatation of some already existing cavity, then I know of no such affection of the prostate, either from personal examination or on the report of others. Such cysts are found in many parts of the body, containing hydatids, jelly-like material, serous fluid, &c. But in the prostate we find no such isolated cysts as, for example, in the kidney, nor any formation indeed which can be regarded as analogous to that, which may be considered as the type of simple fluid cysts. Although I have, in conformity with the practice of other authors, referred to 'cystic disease' of the prostate, it does not appear that the use of the term is warranted by the phenomena presented; and if retained, it must be held to signify a formation of a wholly different kind from that which is indicated by it in the breast or kidney; neither is any species of proliferous cyst ever met with.

Cavities are frequently found in the prostate, but these manifestly belong to one of the three following orders:—

(*a*) Mere dilatation of gland-follicles.

(*b*) Cavities containing pus; abscess.

(*c*) Cavities containing concretions or calculi, the walls of which become denser and firmer in proportion to their magnitude, which corresponds with that of the contained body.

Of the first kind, viz., dilated gland follicles, examples may be found in most prostates from elderly subjects; as has been before seen, some of the gland-follicles generally exhibit a tendency to enlarge or dilate as age increases. The cavity is often filled with yellowish, semi-fluid material, or with yellow, semi-transparent concretions, of so small a size as only to be discernible with the microscope. And it appears that the increase in size of the contained and of the containing parts takes place *pari passu*.

The second kind, viz., cavities containing pus, offers no subject for remark here. These have been fully examined and described in Chapter IV., on the results of inflammation, under the heads of Acute and Chronic Abscess.

The third kind of cavities consists of those which contain solid formations, whether concretions or calculi. It is common, when making sections of the prostate from an elderly subject, whether it is hypertrophied or not, to find cavities, of a somewhat irregular form, in its substance, having all the appearance of being dilated follicles of the glandular structure, which contain numerous little dark-coloured concretions. I have seen from thirty to fifty of these bodies occupying a cavity about the size of a grain of wheat or of a small pea.

But larger concretions, that is, of the size of pearl barley, may occupy each a separate recess of its own; and on removing the foreign body, a spherical, thin, and smooth-walled cavity is displayed. Sometimes hundreds of such small cavities may be found in one prostate,—but this is a very rare circumstance. A good example may be found in the Museum of the College of Surgeons, Prep. No. 2519.

The cavities referred to do not attain a sufficient size, nor, as far as I know, do they give rise to any symptom whatever, to render a knowledge of their presence possible during life. Generally speaking, they are capable of holding not more than a few minims of fluid. The late Mr. Coulson describes one case in which such a cavity was capable of containing as much as half an ounce; and he regarded this as a dilated duct.[1] In one instance, I removed a number of these small calculi during life, from a sac just at the neck of the bladder, not without difficulty, by means of a very small scoop lithotrite at several sittings; the case was seen in consultation with Mr. Savory of St. Bartholomew's. Such an opportunity of meeting with these bodies is, however, exceedingly rare.

Hydatids of the Prostate.—It is doubtful whether hydatid cysts have been met with in the prostate. The only case on record which may have been an example is one which occurred in the Sussex County Hospital, and is recorded by Mr. Lowdell in the 29th vol. of the 'Med.-Chir. Trans.' The author expresses a doubtful opinion on the subject, but appears to incline to a belief that the prostate was the seat of the hydatid formation. Six other cases may be referred to in which retention of urine and distension of the bladder occurred as a result of a hydatid cyst *between the bladder and rectum*, near to the neck of the former; but in which the prostate was not affected except by pressure. Prostatic enlargement was very closely simulated, certainly in three of them, and in two the prostatic catheter was employed under the belief of its existence.

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[1] *Op. cit.* 5th ed. p. 587.

The first was reported by John Hunter, in the Transactions of a Society for the Improvement of Medical and Surgical Knowledge, vol. i. p. 34. Here the retention caused death, and between four and five pints of urine were found in the bladder at the post-mortem examination. The viscus was pushed up into the abdomen by the pressure of the cyst below.

The second, by Mr. Curling, appears as an appendix to Mr. Lowdell's paper in the volume referred to above, page 356. Here the same appearances were observed, but in a less marked degree, relief having been given to the retention during life.

The third case occurred to the late Mr. Callaway, at Guy's Hospital, and is referred to in the 'Medical Times' of February 17, 1855. Hydatids were removed when the catheter was passed. After death a large hydatid tumour was found between the bladder and rectum, pressing on the neck of the former.

The fourth, a man aged 40, was admitted into Guy's Hospital with retention of urine; no catheter could be passed, and he died. At the post-mortem, a large tumour occupied the pelvis and hypogastric region, the anterior and upper part of which was formed by the bladder, pushed out of its proper place. The tumour was a cyst containing three pints of hydatids, and forms preparation No. 2104^{52} in the Guy's Museum; near to which is another very similar.

The fifth occurred in a man, aged 59, admitted to the Westminster Hospital with retention of urine, under the care of Mr. White. A catheter could not be made to reach the bladder, which was therefore punctured through the perineum, a pint of urine escaping. He died next day, and a large hydatid tumour was found just above the prostate, pressing against the back of the bladder so as to divide it into two portions, of which the upper still contained two pints of urine; the lower, which held one, having been evacuated by the puncture.

I have recently become acquainted with a sixth case, that of a lad, nine years old, and suffering from retention of urine, in whom a large and fluctuating tumour, occupying the position of the bladder, was felt within the rectum. No instrument could be passed, and the rectal puncture was performed, the result being, not the removal of urine, but of the contents of a hydatid cyst. This relieved the retention, and the boy recovered.

In the Museum of St. Bartholomew's there is a good example of a large hydatid cyst occupying a position between the bladder and rectum. In this case the prostate does not appear to have been affected. It is preparation No. 15, series xxix.

It does not appear unlikely that Mr. Lowdell's case may have belonged to the same category, the prostate being more or less absorbed by pressure from an external cyst, so that the latter came at length to occupy the situation proper of that organ. The case is, however, given here in an abridged form.

HYDATID DISEASE OF PROSTATE. (?)

J. I., aged 64. In Sussex County Hospital, in July 1844, under the care of Mr. John Lawrence, jun. During three or four years had experienced difficulty in making water and frequent micturition; and of late, almost complete retention. The bladder was now emptied by catheter, after great difficulty, and three pints withdrawn. Much pus and mucus passed afterwards. He died in a few days.

P.M.—Bladder very much thickened, and in the situation of the prostate was a tumour larger than a fœtal head, which, when cut open, proved to be a hydatid cyst, closely packed, the true substance of the prostate being lost in it. Hydatid tumours were also found in the omentum.

Whether the hydatid cyst was formed in the prostate itself, or external to the organ, destroying it by pressure alone, is stated to have been a matter of doubt. Appearances led Mr. Lowdell, who reports the case, to the former view. The facts of hydatid disease of the prostate being unrecorded, together with the existence of other tumours in the omentum, inclined him to believe that he 'should be scarcely warranted in maintaining that opinion without question.'—*Trans. Med.-Chir. Soc.*, vol. xxix. p. 253. 1846. By George Lowdell, Esq.

CHAPTER XIX.

THE BAR AT THE NECK OF THE BLADDER.

Relation of this subject to Prostatic Enlargement—Most Organic Obstacles at the Neck of the Bladder are Prostatic—A few Cases which are exceptional—Mr. Guthrie's Recognition of them—His Views defined—Views of Civiale, Mercier, Gross, Leroy—A Bar may be due to repeated Contractions of the Bladder from any cause whatever, if long continued—Shown to consist, in such cases, of Muscular Hypertrophy—Examples—CONCLUSIONS on the whole subject—Rarity of any affection meriting the appellation of Bar in absence of Enlarged Prostate —DIAGNOSIS—TREATMENT—When due to Muscular Hypertrophy, as in Stone or Stricture, will disappear on removal of the cause—Mr. Guthrie's Proposal to divide Obstructions at the Neck of the Bladder—Mercier's Modes and Instruments—Bottini's Method by Electric Cautery.

A CONDITION of the neck of the bladder is often observed, mostly coexisting with hypertrophy of the prostate, to which the term, 'Bar at the Neck of the Bladder,' has been applied. And such a description not inaptly conveys an idea of the morbid change which is present. It will, therefore, be considered under the title referred to, although constituting rather a variety of disease already studied than a specific affection of another kind.

We have already seen in Chapter V., that a bar at the neck of the bladder is frequently due solely to enlargement of some part of the prostate; but a somewhat similar obstruction is sometimes, though rarely, present when that organ is not the subject of disease. It is to this latter condition that the term, as designating a distinct affection, has usually been applied in this country.

Although numerous forms of obstruction at the neck of the bladder have been frequently described, at some length, by the well-known French writers of the present century on urinary diseases, under the names of 'bourrelets,' 'barrières urétro-vésicales,' 'brides,' and 'valvules,' no specific distinction was recognised between the form of obstacle about to be described, and that which consists in senile enlargement of the prostate, until the late Mr. Guthrie called attention to the subject in his lectures at the Royal College of Surgeons in 1830. He examined it with care, and arrived at more precise views respecting it than any previous writer had done, pointing out the distinctive characters of the two affections, the prostatic and non-prostatic; and the term which he employed to designate the latter is retained here, in the sense which he originally intended it to convey. The views which he entertained respecting the distinct character of the two affections are summed up briefly by himself, and may be given here in his own words. He concludes:—

'1. That an elastic structure exists at the neck of the bladder, and may be diseased without any necessary connection with the prostate gland.

'2. That the prostate may be diseased without any necessary connection with the elastic structure.'

He quotes two cases, one in which, 'without any affection of the prostate, and particularly of the third lobe, the patient passed his water with great difficulty, in consequence of the barrier formed by this unyielding structure, and died ultimately of the disease, after much suffering.' Another, in which, as a consequence of unequally enlarged lateral lobes of the prostate, the right being most so, the mucous membrane of the neck of the bladder had been drawn up 'so as to form a bar across its under part. This bar,' he adds, 'is quite membranous, and does not include the elastic structure which is not diseased, *neither is that part called the third lobe*, nor is there any projection into the bladder, save the bar or valve formed by its mucous membrane at the very meatus.'[1]

Of these two cases, as the author observes, one was exactly the reverse of the other. Each is, indeed, typical of two perfectly distinct classes of abnormal conditions affecting the neck of the bladder.

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[1] *On the Anatomy and Diseases of the Urinary and Sexual Organs, being the first part of the Lectures delivered in the Theatre of the Royal College of Surgeons in* 1830, pp. 23 and 25. By J. G. Guthrie. London, 1836.

In the latter example there is presented merely a natural result of certain forms of prostatic enlargement which are occasionally met with, and some examples of which exist in our museums, in which the growth upwards of the lateral lobes alone has the effect of drawing up the mucous membrane from parts below, and sometimes with it some subjacent fibrous and muscular structures, but in which there is little or no enlargement of the median portion. In the former case there is an unnatural elevation of certain fibrous structures which underlie the mucous membrane at the posterior or vesical limit of the urethra, but which is unaccompanied by, and unconnected with, any enlargement of the prostate.

It is particularly necessary to draw the distinction clearly between the affection, to which Mr. Guthrie thus applied the name of 'Bar at the Neck of the Bladder,' and that obstruction which is constituted solely by an enlarged median portion of the prostate itself. Views differing very much from those which Mr. Guthrie held have been frequently promulgated as his respecting it. Thus the bar has been described by more than one author as an eminence situated just *behind* an enlarged middle lobe of the prostate. Now this is clearly not what was intended by Mr. Guthrie; nor can the eminence described be said to have for its locality 'the neck of the bladder' at all, inasmuch as it must necessarily lie behind it. As we shall see hereafter, the eminence so indicated is formed by an hypertrophied condition of those muscular bands which intervene between the two orifices of the ureters, and which are generally known as the 'muscles of the ureters.'

Civiale devotes a chapter to the consideration of this subject. He describes the 'vesico-urethral barrier' as formed in some cases by 'a simple fold of membrane, smooth and thin, and almost transparent, extending from one lobe of the prostate to the opposite;' and in others by a fold, thicker, in the form of a rounded cord, which contains some fibrous or muscular tissue.[1] These two forms correspond to Guthrie's bar. In other instances it partakes more or less of prostatic substance. And he adds that a considerable barrier may be found after death, when no symptoms have existed during life; while in other cases a train of very painful disorders of the urinary apparatus may result from an inconsiderable membranous fold, giving rise, however, to very decided obstruction at the vesical neck.

He also reviews the alleged causes of these valvular obstructions, that is, when not due to enlarged prostate, viz., spasmodic muscular contractions, rheumatism, &c., and expresses his opinion that we have no certain knowledge of the etiology of the affection.

Mercier, who is familiar with Mr. Guthrie's views on this subject, but does not altogether coincide with them, describes, as the usual form of urethro-vesical barrier, a 'semi-annular eminence, very like the pyloric valve of the stomach, if it existed only on the lower half of the orifice.' He recognises two distinct kinds: one produced by spasm of the muscular fibres which close the neck of the bladder, these fibres having become permanently contracted in some individuals after long-continued and repeated attacks of the spasmodic affection, so that a permanent bar is the consequence; the other kind being simply the result of hypertrophy of the median portion of the prostate. Regarding the first, or muscular bar, he states that the seat of the affection is the tissue at the apex of the trigone, between the mucous membrane and the prostate. The occasion of it, he believes, may be the presence of stricture, calculus, or any other excitant of continued spasmodic action in the muscular fibres referred to. It may take its rise also in an attack of inflammation of the neck of the bladder, and following generally gonorrhœa, although sometimes due to other causes. Consequently examples of it, he says, may occur in men much younger than those who are the subjects of the prostatic bar, and this will aid the diagnosis. But the angular sound will generally determine the difference, since in the muscular bar the beak on being introduced can be rotated freely, but in the prostatic bar the rounded eminence which it forms prevents this act of rotation.[1]

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[1] *Traité Pratique*, vol. ii. p. 244.

Dr. Gross, of Louisville, recognises the two forms described by Mr. Guthrie, and gives his adhesion to the view, that the non-prostatic bar has its origin in the presence of hypertrophy of the bladder, which may arise, therefore, from any of the ordinary modes of obstruction which lead to that condition of the vesical coats.[2]

M. Leroy d'Etiolles recognised only the occurrence of valvular obstruction at the vesical neck, when produced by prostatic enlargement. To this common form of disease he gave considerable attention, having treated of it in various papers in the French journals, and in his own published works, during nearly thirty years past.

The form of bar described by Mr. Guthrie, as illustrated by the second of the two cases cited by him, viz., that which is formed by the drawing up of the mucous and submucous tissues, through upward development of the lateral lobes of the prostate, can, of course, only be seen in those cases where enlargement affects these, but not the median portion, or, at all events, not to a considerable extent. Examples of this kind are by no means common, for a tendency to the formation of outgrowth is usually manifested in the median portion, when any hypertrophy of the prostate exists; consequently, it cannot be regarded as a common, but, on the contrary, only as an unfrequent affection. A few specimens exist in the Museum of the Royal College of Surgeons, in which such a barrier exists; those, for example, numbered 2488, 2489, and 2490.[1] Besides these, there is a very similar specimen in the Museum of University College. But that condition in which a fold of mucous and submucous tissues obstructs the posterior border of the neck of the bladder, no prostatic enlargement, stricture, or vesical disease being present, is still more rare.[2] Nevertheless, although I have occasionally seen an example of the kind here described, it has been so unfrequently, that I cannot do otherwise than regard it as extremely exceptional, notwithstanding that Mr. Guthrie has expressed himself to the contrary. I am persuaded, after careful and repeated examinations, that unnatural elevations at the neck of the bladder are more frequently caused by some enlargement or outgrowth, however small (and they may be seen in all degrees of development), springing from the posterior part of the prostate; and that such are not mere elevations of the mucous and submucous structures only, but are commonly formed by genuine prostatic enlargements, united with the main body of the organ by proper ducts, not difficult to be traced.

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[1] *Recherches sur le Traitement des Maladies des Organes Urinaires, &c.*, p. 209 *et seq.* Paris, 1856. Mémoire 6me.

[2] *The Diseases, Injuries, and Malformations of the Urinary Bladder, &c.*, 3rd ed. p. 59. By S. D. Gross, M.D. Philadelphia, 1876.

In such case the small prominence rising in the centre of the floor of the vesico-urethral orifice elevates a little crescentic fold of membrane and underlying tissues on each side, and often, whatever magnitude the glandular growth subsequently attains, these folds still rise with it. It is through such a fold that the point of the catheter is not unfrequently forced in relieving retention of urine, in which case, of course, the minimum of injury is inflicted on the parts. Such lesion is usually followed by considerable hæmorrhage, and happily, as a rule, by no other formidable symptom.[3]

But while such is the character of the commoner forms which obstruction at this spot assumes, there is, undoubtedly, another, not unfrequently met with, distinct from it, and which is probably that attributed by Mercier, in the paragraph above quoted, to muscular spasm. In a specimen of it, the uvula vesicæ is seen to be unduly elevated and developed into a transverse ridge of varied size; there is a considerable decrease in the antero-posterior diameter of the floor of the bladder, or trigone, and the muscular bands which define that space are hypertrophied, as is also the structure of the bladder generally. Further examination shows an absence of enlargement of the prostate, but there is usually either stricture of the urethra, or the patient was the subject of calculus or of some other cause of long-continued irritation of the bladder. Thus, in many preparations of the urinary organs in which urethral obstruction has long existed, the floor of the bladder presents the appearance of having been compressed from before backwards; the orifices of the ureters have approached much nearer to the internal meatus than is natural, and the muscular eminence, which unites them, is unduly developed; while the uvula, or the structures occupying its situation, have become more salient, and form a marked prominence across the posterior part of the neck of the bladder, very different from the thin or membranous bar. On making a vertical section of the neck of the bladder and prostate, this elevation is seen to be due to an augmentation of the natural constituents composing the uvula, that is, of fibrous and muscular elements, while the prostate, as before said, is in no way increased in size. Now this morbid condition was recognised by Sir Charles Bell, and formed the subject of a paper published in the Transactions of the Medical and Chirurgical Society, vol. iii. 1812, entitled 'An Account of the Muscles of the Ureters, and their Effects in Irritable States of the Bladder.'

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[1] No. 2489 is represented by Sir E. Home, in his work on the Prostate, vol. i. plate v. He describes it as 'a transverse fold of the membrane of the bladder between the middle and lateral lobes,' and speaks of it as 'a part which merits particular attention, since it increases the obstruction to the passing of the urine, by preventing it from getting round the sides of the protuberance.' (p. 251.)

[2] There is only one example of this in the College of Surgeons Museum. It bears Mr. Guthrie's name, but is not numbered in the Catalogue. It is one on which he set great value as demonstrating the existence of this affection. See *op. cit.* p. 23.

[3] Preparation No. 2513, in the Museum of the Royal College of Surgeons, is that of a case in which the perforation was done with precisely the result described. The patient lived five years afterwards. The Museum contains six other examples of the operation of perforation of the median portion, in order to relieve retention.

He there explained his views of the mode of arrangement of those bundles of muscular fibre which appear to be connected with the function of occluding of the orifices of the ureters, and opening of the neck of the bladder. They are greatly hypertrophied when increased action of the bladder has been long kept up by some source of irritation, and the result is that an approximation of the vesical neck to the orifices of the ureters takes place. But Sir Charles Bell stated that it was the 'middle lobe of the prostate,' to which this muscular apparatus was attached, and he suggested that the undue development of that lobe was, in all cases, mainly due to their mechanical action, drawing upon it, bringing it into its unnatural position, as it were, by repeated efforts; and by the irritation in it thus produced causing its hypertrophy. This theory gave too much prominence to the mechanical action described, which is obviously inadequate to produce the prostatic obstruction it was presumed to account for. At the same time, it made no advance towards the discovery of a primary cause for the prostatic enlargement, inasmuch as no explanation could be offered why the muscles should act on some prostates and not on others.

Moreover, the muscular bundles in question, it is now well understood, are not inserted, in the manner described, into any portion of the prostate; but are disposed in the following manner. Having united with the submucous layer of the bladder, they continue onwards to the vesical orifice, those of each side crossing each other there, and forming the 'uvula;' they then become continuous with the longitudinal muscular coat of the urethra.[1]

But further, an examination of the preparations in our museums demonstrates that the development of the 'muscles of the ureters' does not by any means necessarily coexist with enlargement of the median portion of the prostate; but that it is produced when extraordinary contractions of the bladder have been long habitually exerted, whatever may have been the nature of the obstruction which has called them into play; and that the appearance of the prostatic enlargement itself, rising, as it often does, into the bladder in a polypoid form, with a pedunculated base, does not indicate that it has been drawn into position, or in any way produced by muscular action. Furthermore, the best examples of the hypertrophied muscular apparatus in question, and of the elevation at the neck of the bladder associated with it, are found in connection with long-standing stricture of the urethra and not in cases of prostatic enlargement.

It should be added that this appearance may be the only thing found sometimes after death, when no cause for urinary symptoms, which may have been severe during life, has been discovered. It is not necessary to suppose, as Mr. Guthrie suggested, that the bar had, even in such a case, been the source of those symptoms. Its existence simply proves that there has long been an undue amount of expulsive effort on the part of the bladder. It is itself but the result of that activity expressed in the form of hypertrophy; and the cause of the undue action which produced the bar has still to be sought. That there are cases of 'irritable bladder,' as it is termed, in which neither stricture, enlarged prostate, calculus, disease of the kidney, nor of the rectum, or other satisfactorily ascertained cause, are present, is a matter of rare but occasional experience to most surgeons. In such, if the symptoms have been severe and long-continued, we shall undoubtedly find, as their result, a state of the muscular coats of the bladder which, in a degree more or less marked, presents the projecting bar at its neck; but we must search more deeply for the cause which produced the irritable bladder, and look upon the anatomical change as its consequence. Doubtless long existing idiopathic chronic cystitis, which is not occasioned by any of the causes above named, or other such local sources of irritation, will likewise produce it, through the extreme irritability of the bladder so occasioned.

It is the presence of this bar in old cases of stricture which, besides the enlarged lacunæ in the dilated urethra behind it, appears to be sometimes the cause of obstruction at the neck of the bladder, long after the instrument has passed the stricture, and which may occasionally cause some difficulty in drawing off the urine by the catheter. It appears also to explain the statement, often made, that a patient with strictured urethra has enlarged prostate also, a concurrence of circumstances less common than might otherwise be supposed. And, lastly, it accounts for some, although not for all, of those cases in which difficulty of micturition and other symptoms of obstruction persist in those who are the subjects of urethral stricture, even after the urethra has been satisfactorily and fully dilated. The bar remains at the neck of the bladder, and occasions obstruction there.

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[1] 'An Account of the Arrangement of the Muscular Substance in the Urinary and certain of the Generative Organs of the Human Body.' By G. V. Ellis, Professor of Anatomy in University College, London.—*Medico-Chirurgical Transactions*, vol. xxxix. p. 327.

As this subject has been regarded in a manner which differs in some respects from that which has been followed by other writers, some examples of this form of bar will be referred to below, consisting in hypertrophy of the tissues at the neck of the bladder, arising from long-continued hyper-activity of the expulsive function, and generally as the result of stricture of the urethra.[1]

The following conclusions present a brief summary of the facts observed in relation to this subject.

It appears: First, that in the majority of cases in which there exists an abnormal obstruction, having more or less the form of a ridge or barrier, situated at the posterior border of the neck of the bladder, the elevation is constituted by an outgrowth arising from the median portion of the prostate.

Secondly, that an organic obstruction may exist at the neck of the bladder when there is no enlargement of the median portion of the prostate.

Thirdly, that in this case it is most commonly due to hypertrophy of the muscular fibres at the neck of the bladder, produced by long-continued irritability of the viscus, and generally occasioned by stricture of the urethra, inflammation, or calculus of the bladder, and occasionally appearing without any of these conditions.

Fourthly, that sometimes the obstruction consists of a fold of mucous membrane and submucous tissue drawn upwards by enlarged lateral lobes of the prostate, the median portion being slightly, sometimes not at all, affected.

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[1] Royal College of Surgeons Museum.—Examples of thickening of the structures at the neck of the bladder, forming a bar, apparently due to hypertrophy of muscles controlling this orifice, are found in Preparations Nos. 2545, 2550, 2572, and 2567, the last-named being the most striking one.

University College Museum.—(No. 482.) A marked example of bar; prostatic urethra dilated behind a stricture at the bulb.

In Guy's Hospital Museum a good example may be seen (No. 2399) of valvular fold of mucous membrane only, forming a thin, sharp, and prominent bar at the neck of the bladder. The urethra passing through the prostate is dilated behind a stricture at the bulb. Nos. 2405 and 2406 exhibit bars at the neck of the bladder, coexistent with stricture.

In none of the foregoing is the bar prostatic in its nature.

The two distinct conditions described in the last two paragraphs are those to which Mr. Guthrie applied the term 'bar at the neck of the bladder,' and which he employed in order to distinguish them from the well-known elevation there caused by enlarged 'middle lobe,' from which they are perfectly distinct, and with which it is obvious they cannot coexist.

The foregoing conclusions show how rarely we have to encounter any affection meriting the appellation of bar at the neck of the bladder, as distinguished from prostatic enlargement affecting that part, or from the condition described as muscular hypertrophy there and generally caused by undue expulsive efforts to overcome obstruction, as in cases of stricture, calculus, &c.

Diagnosis.—The subject of diagnosis of obstructions at the neck of the bladder has been fully considered in Chapter XI., devoted to the subject. (See pp. 110–17.) At the same time a knowledge of the age at which the symptoms appeared will aid the inquiry, as well as of the fact of absence or presence of prostatic swelling from rectal examination. We may be quite satisfied that prostatic obstruction (hypertrophy, hyperplasia) does not exist before fifty-five years of age, and rarely at so early a period.

Treatment of the Bar at the Neck of the Bladder.—It is obvious that when obstruction at the neck of the bladder consists only in an hypertrophied condition of the muscular apparatus described, produced by the irritation accompanying stone, stricture, or other source of continued frequent and painful micturition, no other treatment is necessary, or will be of any service, which does not remove the exciting cause. In most cases there is, indeed, no utility in regarding it separately from that cause; any more than exists for separately treating an hypertrophied or a dilated bladder, or an enlarged ureter, or most other consequences of urethral obstruction or vesical irritation. Remove the cause, and all these secondary evils will generally diminish or disappear. But the case is different when the cause being removed the symptoms are still present, or are but very slightly ameliorated. We must then seek the occasion of the continued distress either in chronic inflammation of the organs, in atony and inertia of the bladder (for treatment of former see pp. 127–40), or in still existing obstruction, probably at the vesical neck. If on examination we find that a mechanical barrier does exist there constituted either by the very common enlargement of the median portion of the prostate, or by the less common one, a non-prostatic bar; and that this barrier, whatever its structure, is the cause of grave difficulties of micturition, the absence of calculus, stricture, vesical tumour, or other such source being absolutely ascertained; it becomes a matter of consideration whether any relief, and if so what, can be afforded.

The late Mr. Guthrie, to whose experience, as the first to call attention to the subject, we naturally turn, says, that the treatmen simple dilatation and by permitting the catheter to remain permane in the bladder, although often useful, does not always succeed which case, he adds, 'the bar, or dam, at the neck of the bladder m be divided, and the question is, how is it to be done with the grea safety?'[1]

The same conclusion has been arrived at by the French surgeo Thus, the tying in a large catheter for a few days in some cases, and others attempts to depress the salient portion by mechanical means, by sounds of large curve, &c., have been resorted to, but with evidence of any benefit arising therefrom.[2]

After discussing the propriety of following the example of Sir Willia Blizard, who, in a few instances, practised incisions resembling tho made in lateral lithotomy for the purpose of affording relief in very confirmed and advanced enlargement of the prostate, Mr. Guthrie suggests that a simple bar may easily be divided, and mentions two instances in which he had so acted with advantage. In these he employed a modification of one of Mr. Stafford's stricture instruments, consisting of a prostatic catheter, containing a blade which was easily projected from the side of the instrument at its extremity, after this had been passed into the bladder, so as to make an incision in the act of withdrawing it; or two incisions might be made, one during the act of entering, and the second as just described. He also intimates his belief that in some cases much relief would be obtained by making an incision in the median line of the perineum into the membranous part of the urethra, and thence dividing the prostate, together with the bar or any other form of obstruction which might exist. This, Mr. Guthrie adds, he has not yet put in practice. Neither were the operations thus proposed employed by others in this country.

But other proceedings with a like object were adopted in Paris about the same time, M. Leroy d'Etiolles having addressed the Academy of Sciences (1832–3) for the purpose of advocating scarifications and incisions of obstructions situated at the neck of the bladder. The instrument which he exhibited to the Academy in 1837, and subsequently employed, was described, I believe, in a paper published in 1840. It much resembled Stafford's urethrotome, just described, excepting that the blade could be projected from either the convexity or the concavity of the curve, this latter being extremely small, like that of the exploring sounds exhibited at page 113. Besides this, however, there was another blade, which was intended to act against the original one, like the blades of a pair of scissors, and to serve the purpose of excising a small outgrowth when necessary.[1]

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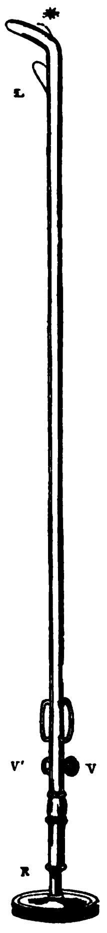
[1] *Op. cit.* p. 274,

[2] *Traité Pratique*, tome 2me, p. 157. Civiale. 1858. Also Mercier and others.

M. Civiale states that he has frequently practised moderate incisions of the obstructing bar under certain circumstances. After describing his method, he adds, in terms which will commend themselves to the minds of English surgeons: 'But I cannot too much insist that we should thus operate only in cases which are perfectly understood, after having recognised with precision the spot on which the instrument is to act, after having placed the patient in the most favourable conditions, and after becoming absolutely certain that all other means of cure have been exhausted.'[2]

M. Mercier, who has paid great attention to this subject, formerly employed the practice of incising freely, and also, in some cases, of excising portions from the obstructing bar. The annexed figure of an instrument for incision is copied from his work[3] (fig. 33). It consists of a silver canula, having the form of the short-beaked sound, containing a blade cutting from either the convex or concave aspect of the curve of the canula already described. When the blade is sheathed the instrument is employed as a sound, and being introduced into the bladder, previously injected with a few ounces of water, the beak is turned downwards, as in sounding behind the prostate. By means of the screw at V an adjustment is made which regulates the distance to which the blade is permitted to slide out of the beak and along the shaft; in the figure that distance is indicated by the letter L. By drawing the circular handle R towards himself, the operator, therefore, makes an incision of the bar against which the beak rests, dividing the tissues more or less perfectly between it and the point L. To ensure complete division, the blade is pushed back again into the beak, and this process may be repeated if necessary. The instrument may also be used in front of the prostate, or an incomplete incision made from within the bladder, in the manner just described, may be completed by placing the beak, directed upwards, in front of the bar

FIG. 33.



Mercier's instrument for dividing a bar at the neck of the bladder.

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[1] *Comptes-Rendus des Séances*, vol. iv. p. 551.

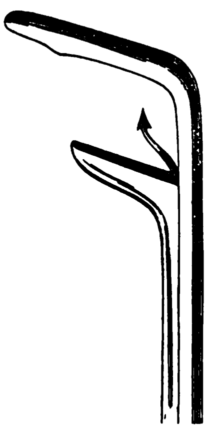
[2] *Traité Pratique*, tome 2me, p. 171. 1858.

[3] *Recherches, &c.*, p. 216. Par A. Mercier. Paris, 1856. M. Mercier has stated, in an extended analysis of my works, which he has done me the honour to publish (*Etude sur Divers Points, &c.* Paris, 1860; and *Gazette Hebdom.*, 1860, several papers), that in the first edition of this work I did him some injustice in my notice

and making the knife project from the canula on its convex asp as seen in the figure, and indicated by the asterisk. In this case screw v′ is first turned in order to regulate the movement. In t manner incision is performed; the method recommended by Mercier, where the bar is narrow, or thin and prominent.

If the bar is rounded and wide, as most prostatic enlargements this situation are, he attempted to excise a portion by means of an strument somewhat similar to a lithotrite (fig. 34). Having tun the beak downwards, he seized a portion of the obstructing prost between the blades, and transfixing the yield tissue by means of an arrow-headed needle (figure), closed the blades, and in so doing exci the portion contained. This, being fixed by t needle aforesaid, is removed when the instrume is drawn out. Frequently some bleeding, gen rally a good deal, followed this process; som times it occurred to a dangerous extent. This w to be treated by injections of cold water, by el vating the pelvis above the level of the head, an by internal astringents. After the operation th patient was desired, in the surgeon's presence, to empty the bladder of the water injected previously. It is important, says the author, that he should do this while lying on his side, and without effort. If it does not flow, a full-sized catheter, with large eyes, should be passed. A catheter should not be left lying in the canal, as it provokes spasm and repeated desires to pass water, and so favours bleeding. It is better to pass an instrument from time to time when the patient feels the desire to urinate.

FIG. 34.



After some extended remarks upon the subject of hæmorrhage, M. Mercier says, 'It is at present the only serious accident which I have observed to result. I repeat that by the aid of the means indicated I have never failed to overcome it, and my experience rests on a sufficiently extensive base, since my operations have reached the number of 300, some of my patients having been operated upon several times.'[1] More recently he has stated that there is less to be feared on this score from excision than from incision, because the vessels are more crushed

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of his views and proceedings, in describing his instrument and operation as a modification of those of Leroy d'Etiolles. After a re-examination of the subject, I come to the conclusion that the difference is essential, and that, although there is an obvious resemblance in the form of the instruments employed, the proceeding of M. Mercier is original and distinct as compared with the scarifications made by Leroy. I exceedingly regret that I should have erred in not attributing the utmost value to the labours of one for whose original and sagacious observations I entertain the highest respect. [Note appearing in 2nd edition of this work.]

[1] *Op. cit.* p. 240.

by the former process, while in the latter they are more cleanly cut. About six days after the operation he passes a flexible catheter with great care, lest hæmorrhage be excited, and, according to circumstances, but generally about the tenth or eleventh day, having introduced the same catheter, he passes into it an elastic steel stilet, in order to make pressure with it upon the seat of the wound by way of preventing union, increasing the force employed from the second to the third week following the operation. He speaks in decided terms of the benefits which have followed the practice, citing the reports of fifteen cases in illustration, in five of which the patients were examined by the Commission of the Argenteuil prize. Of the fifteen, two died: one of dysentery, one of 'fever.' In five cases, in which the urinary difficulties, such as habitual retention and dysury, had been considerable, complete relief is stated to have been afforded, and had been verified as continuing in one case during four years, in another two years. Seven were improved in various degrees, some considerably; these were reported by the author as cases of cure. In one no alteration was produced by the operation in the power of passing water, but he can pass a catheter, which previously he was unable to do. Such are the results obtained by a perusal of the fifteen cases reported by the author himself.

later years, the same treatment has found an advocate in
or Bottini, professor of surgery at Milan. He endeavours to
ee division of prostatic obstruction by means of a wire heated
electric current, and has devised an instrument well adapted
t that object. He states in his little brochure on the subject,[1]
s personally informed me, that he is satisfied with the advantage
some of his patients have derived from division thus made. By
nner of performing division of the part, one great objection to
ting procedure, viz., the hæmorrhage, is no doubt avoided; in
letails it is identical with the proceeding above described.

endeavouring to appreciate the operations initiated and advocated
rcier, it must be regarded as a significant fact that they have
been generally accepted by surgeons, and have not been recog-
as possessing much, if any, practical value. In other words, they
ot been proved competent to relieve those well-known and very common cases of complete prostatic obstruction, in which the patient is compelled to rely solely or chiefly for the removal of his urine on the catheter. To confer on such a patient the power to empty the bladder by his own efforts would be an enormous boon. And there are hundreds of persons in the condition described, who would welcome, even at the cost of some risk, an operation which might be relied upon to restore the lost function. This procedure of Mercier, and various

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[1] *Di un nuovo Cauterizzatore ed Incisore Termogalvanico contro le Iscurie da Ipertrofia prostatica.* Bologna, 1874.

modifications of it, have been, from time to time, referred to by a few writers as practicable, and have been vaguely described as 'successful;' but it must be said that the evidence of successful results in the persons of patients of the kind described has not been produced, and still is not forthcoming. In the early stage of prostatic enlargement, it is quite conceivable that such an operation may be followed by a year or two of freedom from symptoms. But then we know that such a respite is a natural occurrence in the order of events at this period of the history of the case. How often after the first attack of prostatic retention, followed by a week or two of enforced daily catheterism, does the retention spontaneously subside, the patient regaining his power of micturition, and continuing even for two or three years to be untroubled by symptoms. But almost inevitably a subsequent attack appears, and this time it announces the advance of enlargement, and with it probably the establishment of chronic retention.

No interval of tranquillity, occurring at the earlier stage described, can, therefore, be claimed as a surgical success. But let the operation confer permanent ability to micturate naturally, on one who in consequence of enlarged prostate has passed all his urine by catheter, say, for a year, and then the procedure may claim a position demanding our serious consideration.

Further, in relation to this subject, let me cite Professor Guyon's recent testimony, which is very valuable, because he tells us that he has had the opportunity of examining for himself three patients at a considerable period of time after Mercier had performed on them the operation in question. The conclusions therefrom are extremely unfavourable to the proposal. And he adds, very justly, when we examine the pathological specimens which the autopsies of prostatic patients have furnished, it is rare indeed to meet with an organ so formed as to afford the slightest hope that by any proceeding of incision or of excision, an iota of benefit could have accrued to the case. He regards the suprapubic operation as the most promising method of dealing with obstruction at the neck of the bladder, if surgical interference in such circumstances seems ever to be necessary.[1]

Others have, I think chiefly on theoretical grounds, suggested that an incision through the prostate by the operation of lateral lithotomy might enable a patient, hitherto entirely dependent on the catheter, to dispense more or less with the instrument in after life. Such is not my experience. I have now performed that operation in three instances on patients so circumstanced, and have watched with the greatest interest, and with some hope, for improvement. Two of these survived, but neither of them recovered any power after the wound had healed to pass urine by his own efforts. In both cases the intervals between micturition were prolonged as a result of the operation; for the calculus had been removed and the bladder had been drained. In three other cases of lithotomy at least, I have removed fibrous tumours from the prostate which lay in the way, and without observing subsequent improvement. I have opened the membranous urethra ('digital exploration') solely for the purpose of resting and draining the bladder, in several cases, and have never found on examination any form of prostatic barrier which I could attempt to divide. Nor has the function been restored after the wound has closed, although the chronic cystitis and its distressing symptoms have been greatly relieved. This operation, I think, is the most likely to afford, at the smallest risk, the opportunity of performing incision or excision, if the obstruction met with, when examined by the finger, possesses physical characters appearing to indicate that either of these two methods of treatment might be useful.

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[1] *Annales des Mal. des Org. Gen.*, June 1885, pp. 344–7.

And lastly, I by no means deny that circumstances may arise in which the suprapubic operation might be adopted as the most prudent course. Our resources cannot be too numerous or too powerful to enable us to meet with the numerous and varied complications which are presented among that large class of elderly patients who suffer from chronic vesical disease.

CHAPTER XX.

PROSTATIC CONCRETIONS AND CALCULI.

PROSTATIC CONCRETIONS—Distinct from Calculi—Physical Characters to naked Eye and Microscope—Chemical Characters—Analysis—Are they Natural or Abnormal Formations?—Mode of Formation, and History—May become Nuclei for Calculous Matter—Analogy between Prostatic and Biliary Concretions—and other Concretions—Views of Handfield Jones, Quekett, Virchow, Wedl—PROSTATIC CALCULI—Different kinds, sizes, &c.—Analyses—Situation—Numerous Examples—Operative Measures for Removal.

IT is exceedingly common, when the urethra of an elderly male subject is laid open, to observe in the prostatic part, lying around the verumontanum, and in the orifices of the prostatic ducts especially, numerous little brownish or blackish bodies, the largest of which ordinarily met with are about the size of poppy-seeds. They are not free in the canal, but generally lie just within some of the orifices named, or beneath the epithelial layer of the mucous membrane of the urethra, barely visible over them. Again, when a section of the prostatic substance is made, especially if the knife be directed backwards and outwards on either side of the verumontanum, many of the same bodies may be seen. Indeed they may be dispersed through all parts of the organ, although they rarely attain the size named in situations very remote from the urethra.

These bodies have received the name of Prostatic Concretions. They have in their origin no relation to urinary calculi; nor should they be confounded with the hard white porcelain-like masses which are sometimes met with in the prostate, and in the perineal region also. It is the more necessary to draw the distinction, as the concretions have not unfrequently been spoken of as urinary calculi, and still oftener are viewed as having a similar constitution, and as not being, as they are, generically distinct. They will therefore be considered here separately.

Prostatic Concretions.—The bodies described above under this term are not generally observed before middle or advanced age. But although, as a rule, to which there are occasional exceptions, no examples visible to the naked eye can be detected during the periods of youth and early manhood, the microscope reveals them of very small sizes at all ages, except that before puberty. In the first series of fifty prostates examined by myself they were present in every instance.

In the early stages of formation they present very beautiful microscopic objects, varying in size, for the most part, from about the one-thousandth to the one-hundredth of an inch; generally oval in form, sometimes angular, and then apparently from the result of mutual pressure. They have a yellowish hue, varying between the faintest tint and a deep orange, evidently acquiring intensity of colour with age or increase in size. They have a well-defined outline, as if limited by some kind of cell-wall, and exhibit numerous concentric rings in their anterior, which, although the object is more or less translucent, suggests strongly to the observer the appearance of a uric acid calculus when cut; a resemblance which has no doubt suggested a relationship with formations of that class. The central part, or nucleus, as it has been termed, does not usually exhibit these rings, but has a cellular appearance, as if constituted by a conglomeration of corpuscles partially fused together. This central mass varies in size, but is usually present; and around this the concentric circles are placed. Often two, three, or more of very small concretions are seen lying closely together, each possessing more or less angularity, and forming the nucleus of a larger formation: occasionally lines are seen radiating from the nucleus to the circumference; sometimes cleavage of the mass takes place in the direction of these lines. Sometimes the concretion appears to consist almost entirely of the agglomerated corpuscles; at others these exist in very small relative proportion to the concentric rings, in which latter no trace of corpuscular arrangement can be detected. It is easy, when examining a considerable number, to trace a series of these small semi-transparent bodies, as it were, in different stages, until they gradually become the dark, almost opaque, forms at first described, and large enough to be visible to the naked eye. Even in the latter some remains of the concentric arrangement may be occasionally observed, but, generally speaking, they are too dark and opaque to transmit light, and only appear as dark-brown masses of spheroidal form, with enough of translucency to enable the eye to detect easily at their edges that they have really a deep orange or red colour. In consistency they have also considerably changed. In the early stages these bodies are soft, and readily cleave or divide as a soft body does under superincumbent pressure, even when as large as the one-hundredth of an inch, by the application of a very little weight to the thin glass which covers the object under the microscope. But when they have arrived at the size and colour above described, they have acquired also considerable solidity, are firm and even brittle when force is applied to break them.

Their chemical reactions are peculiar. The small soft pale and yellow bodies are not acted on by acetic, nitric, hydrochloric, or sulphuric acids cold; nor by sulphuric ether, liquor potassæ, or ammoniæ. The larger hard and brownish concretions I have found to be unaltered by the addition of alkalies, except that they occasionally become rather more translucent. By hydrochloric and nitric acids they are sometimes influenced, giving off a few bubbles of gas, and slightly diminishing in size. Sulphuric acid liberates gas more rapidly, and sometimes after they have ceased to be affected by the former acids. Occasionally they become soft and disintegrate into amorphous matter, losing very little of their colour or bulk by immersion in sulphuric acid. On the other hand, some specimens appear to be very little affected by any reagent.

In order to obtain an exact qualitative and quantitative analysis of these bodies, I submitted about 200 of the hard dark-coloured concretions to Dr. William S. Squire, who, after a careful investigation, furnished the following report:—

'Immersed in acetic acid the concretion resists its action; but if broken before this agent is applied, it becomes slightly softened and swollen. Nitric acid, cold, has no effect; when hot it dissolves the concretion entirely, producing a very slight yellow tint. A portion of the concretion treated with a solution of iodine does not change colour. Sulphuric acid and sugar do not produce any effect characteristic of protein. When treated with a solution of potash, hot or cold, there is no change, and on adding an acid no precipitate is formed in the alkaline liquid. When the concretion is heated, a strong ammoniacal odour is evolved.

'From these reactions I conclude that the organic constituent of the concretion is not a true protein body, but most probably belongs to that class of nitrogenised substances, sometimes termed protein derivatives, of which fibroin, gelatin, and chitin are examples.

'The following results were obtained by incineration:—

Concretions	·0244 gramme
Yielded of Ash	·0112 „

which equal 45·9 per cent. of residue. This consisted chiefly of phosphate of lime, with a small quantity of the carbonate.'

Is the presence of these concretions in the prostate to be regarded as a natural or as an abnormal circumstance? This question has been variously answered. I have examined not less than a hundred prostates, at all ages over twenty years, and have detected them in every one. I have found them also in one specimen at fourteen years of age, and have failed to find them in childhood. There is much difference, however, as to their number in different cases. In some—in most after fifty years of age—they are obvious enough to the naked eye in the urethra around the verumontanum as soon as the canal is laid open; in others it is necessary to make section of a lateral lobe, to scrape the surface, and place the milky semi-transparent fluid under the microscope, when they may be seen, sometimes in small, sometimes in large numbers. At other times it may be necessary to make several such sections before finding any. They are smaller, paler in colour, or even almost destitute of it, in young subjects, and *vice versâ* in aged; but there is not an unvarying relation in regard of number, size, &c., between their development and the age of the subject. In No. 15 of the table, from a man aged sixty-six years, I found more than in any I have ever examined, including subjects at ninety. I estimated the number of dark-coloured concretions visible to the naked eye in this case as amounting to several thousands.

Generally speaking, they have been considered abnormal. Among the few who have investigated this subject, Wedl regarded them as the product of enlarged prostate.[1]

From the facts above cited I cannot but conclude that their existence is a necessary result of the performance of natural functions on the part of the prostate, although there does not appear to be any evidence to show that they ultimately disintegrate and yield up 'some elements to the natural secretion of the gland,' as has been suggested by an observer who has studied them closely.

The examination of the preparations referred to resulted in the following conclusions respecting these bodies. The method adopted in their examination may, however, first be described. The urethral surface of each prostate has been exposed, and some concretions, if present, removed for examination. These have been submitted to the chemical tests enumerated, of which the results have been already given. Next, several sections have been made with Valentin's knife, and examined *in situ*. The best of these were mounted in preservative fluid, from which the following figures were admirably drawn by Mr. Tuffen West. The fluid also which exudes from the prostatic ducts on pressure has been separately examined (see fig. 35).

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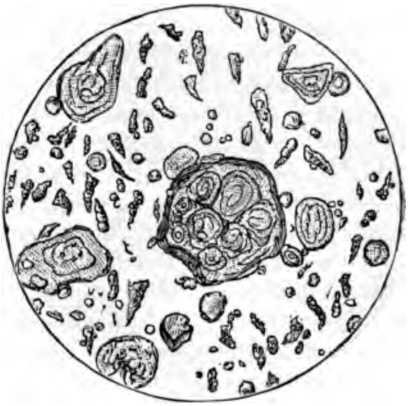
[1] *Rudiments of Pathological Histology*, p. 269. By Carl Wedl. Translated by G. Busk, F.R.S. London, 1855.

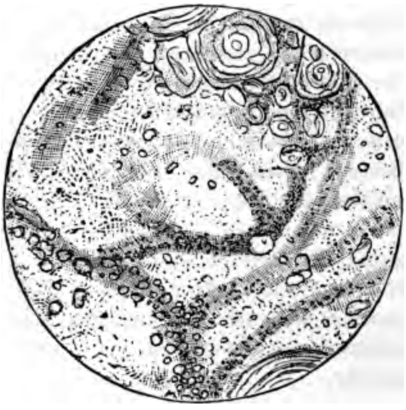
By these observations it appears that, in addition to the corpuscles, obviously epithelial or glandular, which are found abundantly in the prostatic fluid, however obtained, there is always present also a large number of small yellowish bodies, in appearance granular, sometimes homogeneous, about the size of red blood corpuscles, but not so uniform, being from about $\frac{1}{5000}$ to $\frac{1}{2500}$ of an inch in diameter. These possess considerable refractive power, nearly so much as to give them a resemblance to oil globules. They are not acted upon by ether, however, nor by the other re-agents mentioned. They are not only found in the prostatic fluid, but may be washed from sections of the organ, and may be found lying in clusters, aggregated and adhering in various parts of it. Further, it is common to see small ducts and cæcal pouches stuffed with these bodies, as well as with yellow granules of smaller size, several marked examples of which are represented (figs. 36–38). In the larger masses, obviously occupying crypts, or follicles, of the glandular structure, these may be seen not only cohering, but fused together, and then an appearance is presented identical with that which may be seen occupying the centre of the larger concretions.

FIG. 35.



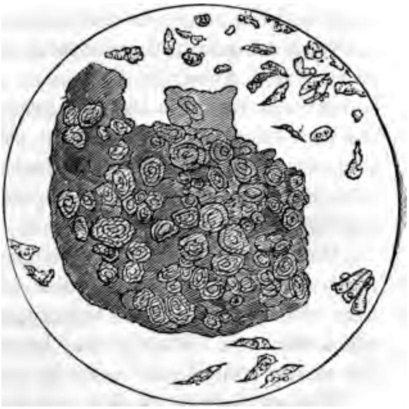
Fluid expressed from the prostate, containing epithelium, yellow granules, and concretions.

FIG. 36.



Small ducts stuffed with yellow granules; small concretions lying free on the section.

FIG. 37.



An aggregation of numerous small concretions forming one large one; prostatic epithelium seen free in the field.

What the 'yellow bodies' are I am not able satisfactorily to explain. Whether they are themselves altered secreting cells from the gland follicles, or whether only the product of secretion by these structures, does not at present clearly appear. Thus much I have observed, that the small fusiform and spheroidal epithelium lining the prostatic ducts is often loaded with yellowish granular matter, appearing in all respects to be identical with that seen in a free state elsewhere, which seems to favour the view that it is a natural product of gland secretion (figs. 35–37). It may be added that I have constantly found similar yellow granules in the fluid of the vesiculæ seminales also, in which, at all events in some elderly persons, they appear to be more constant than are spermatozoa. In this situation, bodies which are evidently the same have been described in an article on the vesiculæ seminales, by Mr. Pittard, appearing in the 'Cyclopædia of Anatomy and Physiology,' as 'very numerous insoluble globules, which have a great tendency to coalesce, and appear very much like oil: their refractive power is, however, less, and there are reasons for doubting that they are really globules of oil.' Besides these, the same observer finds 'suspended like conglomerated masses of transparent solid, just visible to the naked eye,' which have, under the microscope, the appearance of 'a nodulated mulberry-like surface, as if composed of smaller balls;' these, he thinks, are made up by a coalescing of the minute globules before mentioned.[1]

Virchow believes the concretions to be derived from a peculiar insoluble protein substance mixed with the semen. Wedl, before referred to, regards them as identical with certain bodies found abundantly in the enlarged thyroid gland, and with those met with in the brain and spinal cord, especially in elderly subjects, and named 'amyloid bodies' by Kölliker and Virchow. He believes all these to be the result of a pathological exudation frequently occurring in various organs in advanced age, and which he terms 'colloid matter,' on account of its resemblance in physical characters to liquid glue, and he proposes to call the concretions in question 'concentric colloid corpuscles.' He regards them as 'principally composed of an organic substance, and consequently the names of "stones" and "concretions" to be inappropriate;' although he has occasionally observed that the colloid matter is deposited upon some of the rounded or nodular forms of calcareous salts which are found scattered in the parenchyma of the prostate, and which thus form the nuclei of some few of the concretions.[2] A further study of this subject since the above appeared in the first edition confirms me in my opinion that evidence is wanting at present to show that these bodies are examples of amyloid degeneration; or, indeed, that they are the products of any morbid change at all.

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[1] *Cyclopædia of Anatomy and Physiology*, p. 1433.

[2] *Rudiments of Pathological Histology*, pp. 38 and 271. By C. Wedl. Translated for the Sydenham Society by G. Busk, F.R.S. 1855.

Reviewing, however, all that has been ascertained of the mode of formation and constitution of these bodies, I see no valid objection to the use of the term concretions, at all events for the small formations which have hitherto been described. Nor, perhaps, at present, is it easy to find a better, since it is one which involves no theory, except the simple one that the mode of aggregation of their component elements is mechanical rather than organic in its essential character. When they have arrived at a size sufficient to occasion, as sources of irritation, the deposit of dense opaque earthy matter in the manner above referred to, they may be regarded as belonging to the category of calculus rather than of concretion. The inorganic component now becomes predominant, the body increases in size; and although there is no exact period at which it can be said to cease to be a concretion and to become a calculus, yet there can be no hesitation as to which of the two terms could be applied to most examples met with of either kind.

Prostatic Calculi.—Prostatic calculi exist in various sizes and forms. The smaller examples, which are most frequently met with, are rounded or ovoid; the larger are irregular, often elongated, sometimes branched, and commonly consist of several fragments uniting to form a mass. These fragments fit almost accurately one to the other at their adjacent surfaces, but nevertheless appear to be separate and distinct calculi which have become adapted in form one to another by close proximity. The small isolated formations are about the size of grains of pearl barley, rarely as large as peas; and these form the purest specimens of prostatic calculus. The masses formed by coalescence are of all sizes, but have been seen reaching the length of four or five inches in very rare instances. In the latter case they extend into and along the urethra, and even into the bladder. Still in these circumstances chemical analysis shows them to be mainly composed of phosphate of lime, and to have but a small admixture of the ordinary vesical or urinary product, the triple phosphate of ammonia and magnesia. They are in consistence hard, and so close in texture as to bear some resemblance to porcelain. They are white, fawn, or pale brown in colour, the surface being usually of a darker tint than the interior.

Analyses of several of the small round variety have been made, and the composition has pretty generally corresponded with the result of Dr. Wollaston's examination, who first pointed out their chemical character, and showed that they were not urinary products. Dr. Wollaston described them as composed of the neutral phosphate of lime, tinged with the secretion of the prostate.[1] Among modern observations, that of Lassaigne, which is generally quoted, may be adduced as follows : —

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[1] *Phil. Trans.*, 1797, p. 397.

Phosphate of lime	84·5
Carbonate of lime	3·5
Animal matters, &c.	12·0
	100·0

These small prostatic calculi are often found lying each in a separate space for itself, or hollow in the substance of the organ, corresponding with the size of the calculus itself.[1] At other times several occupy a larger space or cavity, in which they are moveable ; and thus their spheroidal form gives place to a more or less angular one, from their mutual pressure or attrition. In this state they may sometimes be felt by the finger introduced into the rectum, and the grating, from their movements one upon another when pressure is made, plainly perceived. At the same time a similar sensation is communicated to the hand by the catheter passed along the urethra, when the instrument traverses the prostatic part. Some years ago I exhibited at the Pathological Society some examples taken from a patient who died at the age of 89 years. The prostate was enlarged, although not greatly so ; but occupying a cavity in each lateral lobe, and immediately beneath the verumontanum, were numerous dark-coloured calculi, very hard in texture, with polished surfaces, each calculus having several irregular facets, varying from the size of a grain of pearl barley to that of a large pea. These characters distinguished them completely from calculi of renal or of vesical origin.[2]

The larger masses met with, occupying partly the prostate and partly a space in the tissues intervening between it and the surface of the perineum, cannot be regarded absolutely as prostatic in their origin like those heretofore described; nevertheless their situation demands that they should be considered under that head in this place. Moreover, while they consist largely of the same material as those of the preceding class, that is, of the phosphate of lime, they usually contain also enough of the triple phosphate in their composition to relate them more or less closely to the class called fusible calculus, this term being understood to embrace many varieties in regard of the relative proportions of the two phosphatic salts. These formations often occupy large spaces in the prostatic substance and among the adjacent tissues ;

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[1] Good examples of these small calculi, imbedded in the substance of the prostate, may be seen as under :—

Royal College of Surgeons, Nos. 2519 and 2520.

University College Museum, Nos. 1640 and 3844. Some examples of encysted calculi of the prostate are well represented in Mr. Crosse's *Treatise on Calculus*, pl. xi. London, 1835.

[2] *Trans. of Path. Soc.* vol. xii. 1861.

irregular cavities which enlarge with the increasing bulk of the calculous formation. It is worthy of observation that they are most frequently met with in young and middle-aged men.

A very complete description of an extremely large calculus of this kind was given by the late Dr. T. H. Barker, of Bedford, who removed a mass formed by 29 portions, weighing three ounces and a half, from a patient 26 years of age. He describes them as of 'a whitish colour, and porcelainous lustre and hardness; indeed the latter character is so well marked that it is with some difficulty that any impression can be made upon them with a knife.'[1] It was found to 'consist of phosphate of lime (like salivary and bronchial calculi), with a rather larger proportion than usual of the ammoniaco-magnesian phosphates.' When the stone was restored by the adjustment of the fragments, it measured 4⅞ inches in length. The patient made a good recovery.

A case very closely resembling this is recorded by the late Mr. B. Gooch, of Norwich. The calculus consisted of sixteen fragments, which when applied to each other formed a mass nearly six inches in length. They are described as being 'like alabaster in colour, and of as fine or rather a finer polish.' A drawing is appended representing the natural size.[2]

Numerous cases have been detailed varying but little from the foregoing,[3] except in the much smaller size of the calculus met with.

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[1] *Trans. Prov. Med. and Surg. Ass.*, 1847, with a drawing of the stone.

[2] *Cases and Practical Remarks on Surgery*, vol. ii. p. 174. Norwich, 1777.

[3] Cases of Calculi formed in the posterior part of the urethra (not merely lodged there), all having perhaps originated in the prostate:—

Mr. Jos. Warner, of Guy's Hospital, removed, from a man aged 20, two hard and polished calculi, weighing 350 grains, from the perineum, where they could be felt by the finger before the operation.—*Phil. Trans.*, vol. li. p. 304, with plate.

A second case, in which the calculi were very much larger, is reported by the same surgeon; patient aged 22.—*Phil. Trans.*, vol. lii. p. 258, with plate.

Dr. Livingston, of Aberdeen, two cases.—*Edinburgh Essays and Observations*, vol. lii. p. 546. 1771.

Dr. Cheston, of Gloucester, one case.—*Medical Records and Researches*, p. 163. 1798.

Mr. Wickham, of Winchester, a post-mortem case.—*Medical Facts*, vol. viii. p. 126. 1800.

Dr. Marcet relates a case in which 100 calculi were found.—Drawn, Pl. ix. *Essay on Calculous Disorders*. 2nd ed. London, 1819.

Sir Astley Cooper relates three cases.—*Surgical Lectures*, 1825. Vol. ii. pp. 295, 296.

Sir B. Brodie, a case in which the calculi were lodged in a sac, from which he removed some by urethral forceps.—*Urinary Organs*, 4th ed. p. 362.

Mr. Crosse, of Norwich, several cases.—*Treatise on Calculus*, p. 26, *et seq.* London, 1835.

Mr. Liston removed one of characteristic appearance in several fragments, by a scoop, through the urethra.—Drawn, *Lancet*, Oct. 28, 1843.

Mr. Fergusson, of London, a case of thirty fragments, forming a mass as large

Many surgeons of the last century refer to them, and to operative measures for their removal.[1]

I have operated in two similar cases, the particulars of which are very briefly recorded below.[2]

The operative proceeding by which large prostatic calculi have been removed is usually an incision in the perineum carried into the urethra upon a grooved staff, in the manner and situation of lateral lithotomy. Occasionally the opening has been made in the median line, *i.e.*, in the raphé of the perineum. Undoubtedly this is the best situation, inasmuch as the median opening gives a more complete command of the position occupied by the stone; and is also a nearer and less hazardous route to the neck of the bladder under these circumstances. The operation is less severe than lateral lithotomy, as the bladder remains untouched, supposing there is no vesical calculus also, a point which must be determined beforehand.

The existence of these bodies, when small and embedded in the prostate, is not revealed by symptoms during life. When by their increased size irritation is set up, abscess may be formed or obstruction

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as a walnut.—*Lancet*, 1848, vol. i. p. 91. Another large specimen.—*Lancet*, 1849, vol. ii. p. 552.

Mr. Erichsen, of London, a case of prostatic associated with vesical calculus in a youth.—*Lancet*, 1850, vol. ii. p. 575.

Dr. B. Jones, a post-mortem case, ten fragments.—*Described and engraved in Path. Trans.* vol. vi. p. 254.

Cases on record in which calculi of this kind have escaped externally through abscess in the perineum:—

Dupuytren, after dilating with the knife some perineal fistulæ, removed 12 calculi with articulating surfaces, from, as he believed, the prostate. Thénard analysed them, and found 86 per cent. of phosphate of lime, 13 of animal matter, and traces of carbonate of lime.—*Journal Univ. des Sciences Méd.*, Aug. 1820.

Lenoir and Nélaton, a case each; made up of several fragments; removed by simple pressure, by lithotrity and by cutting.—*Gaz. des Hôpitaux*, 1846.

Good examples are preserved in the Museum of the College of Surgeons: the best are those numbered H 13, 15, and 23. The first, which is the largest, weighs 1 ounce 95 grains.

[1] Dionis. *Opér. de Chir.* par La Faye, p. 221. Deschamps, *Sur la Taille*, tom. iv. p. 161, *et seq.*, 1796. Sabatier, *Méd. Opératoire*, tom. iii. p. 136. 1810.

[2] A gentleman, aged 44, came to me from China suffering severely with stricture of the urethra, which admitted only No. 2 catheter. This was treated by continuous dilatation, and while doing so stone was felt. On February 17, 1878, I divided the stricture externally from the perineum, and found just outside the neck of the bladder a sac filled with numerous calculi, the fragments fitting by their polished facets. Mr. Clover gave ether, and Mr. G. B. Browne held the staff. He made an excellent recovery, and I have recently seen him perfectly well (1884).

On August 3 of the same year, I operated on a gentleman aged 63, with Mr. Brewer of Huddersfield. I encountered three large calculi in a cavity close to the neck of the bladder, from which I had some trouble in removing them. Their position was well made out beforehand by rectal examination. The calculi fitted each other by polished facets, and weighed two ounces.

to the flow of urine be occasioned; the latter may take place also from the escape of small calculi into the urethra. The treatment consists in their removal if possible by means of the forceps or long curette, or by the instrument as advised for the removal of fragments after the operation of lithotrity, in the succeeding chapter. But when marked symptoms are present, and a foreign body can be ascertained by the sound or catheter to be embedded anterior to the neck of the bladder, or when it can be recognised from the rectum or perineum, an incision from the latter spot offers a simple and efficient means of removing it.

CHAPTER XXI.

ON THE RELATION BETWEEN HYPERTROPHIED PROSTATE AND STONE IN THE BLADDER.

Vesical Calculus a frequent Result of Enlarged Prostate—How this may be accounted for—Calculus often overlooked—Best means of discovering it, by Sounding, &c. Difficulties in removing it—Lithotomy and Lithotrity—Objections to each considered—General Applicability of Lithotrity—The Method by One Sitting the best for most cases—Statistics—Injection of Solvents—Their Use—Superiority of Modern Mechanical Treatment.

So closely connected is enlargement of the prostate, through the resulting chronic cystitis, with the formation of earthy deposits in the bladder, that it is necessary to give some consideration in these pages to that subject, at all events under one of its several aspects, and that certainly neither the least difficult nor the least important one. For no one can have the care of many cases of enlarged prostate without sometimes meeting also one of calculous formation in the bladder, although it is easy to overlook the fact, so much are the symptoms of the one malady masked by those of the other. Of this oversight I have witnessed not a few instances. Nevertheless, the presence of a calculus, although small, ought to be verified, since there is rarely any difficulty in discovering it. And the removal is mostly easy, at all events in practised hands, and is a matter of vital importance to the patient.

The calculus which is met with under these circumstances is generally, although not invariably, a vesical product, that is, one owing its existence mainly to the bladder itself. From the altered condition of urine depending upon long-continued retention within the viscus of a certain quantity which cannot be expelled by the efforts of the patient, chronic cystitis occurs, and more or less muco-purulent secretion is poured out. This action having long continued, some whitish, soft or gritty matter, a phosphatic deposit, appears from the same source; at first, perhaps, only in inconsiderable quantity. This may pass off entirely with the mucus, in which streaky portions are seen to be entangled; and no more than this may occur. The formation may take place in small quantities, and may possess no very great cohesive power, in which case the bladder can be maintained tolerably clear by occasionally injecting it with warm water, either unmixed or to which a minute quantity of mineral acid or of acetate of lead has been added. On the other hand, the calculous deposit may assume a more solid consistence, a nucleus may be formed, and, aggregation taking place, a phosphatic stone may not slowly result. This condition is very much favoured by the state of the urine itself under circumstances of retention, as, instead of being acid, and so affording a menstruum favourable to the solution of a phosphatic formation, it becomes alkaline, and not only tends to produce irritation of the mucous membrane, but also to augment the earthy formation by accretion. In the same manner also, if a solid body be introduced into the bladder while the urine remains in this unhealthy condition, it is almost certain rapidly to acquire a coating of this same deposit. And so it happens that if a small renal calculus which consists of uric acid or urates, or of oxalic acid, descend at this time through the ureter, a large phosphatic stone will probably in no very long time be formed upon it as a nucleus. But this descent of the renal product is no mere contingency under the circumstances, no mere unlikely coincidence with the vesical state, but the contrary. Many individuals between fifty-five and sixty-five years of age, overfed and inactive, pass small uric acid calculi; and in the bladder of a patient who does not empty it by the natural efforts, such an one is almost certain to be detained and to acquire a phosphatic coating.

Thus, the calculous contents of the unemptied bladder appear in three distinct forms, viz. large calculi of firm texture, ovoid or irregular in form; small compact smooth bodies, from the size of a melon seed to that of a bean; and deposits of mortarlike matter, less defined in shape.

Whenever the symptoms accompanying enlarged prostate, especially pain and involuntary straining, are in any case more severe than those which are ordinarily encountered; whenever the occasional appearance of blood in the urine has been noted, unassociated with the use of the catheter, and occurring especially after moderate exercise; inquiry should be made for calculus. We have already seen how much the ordinary signs of its presence may be masked by the enlargement, partly from the fact that the foreign body is less liable to come in contact with the neck of the bladder, and partly because the viscus itself is often unable to contract upon its contents, so that the pain characteristic of vesical calculus, and felt at the end of micturition, is slight, or may be absent altogether. But it is not the less important to verify the presence of stone or the contrary, and a mode of search is required more rigorous in some respects than that adopted in ordinary cases, one specially adapted to the circumstances resulting from this form of complaint. The ordinary silver catheter generally fails to encounter the stone, and thus its presence is not suspected, the daily use of such an instrument without finding it being deemed sufficient evidence. Generally the foreign body lies in a depression behind the enlarged prostate, and is rarely detected except by the use of the short-curved or angular sound, the beak of which can be turned downwards with perfect ease behind the base of the prostate into this depression. In some cases even this movement fails to reach the stone, and other means must be adopted. Thus the finger of the left hand being introduced into the rectum, sometimes suffices to elevate the base of the bladder or to displace the stone, and permit contact between it and the sound to be made. Another mode is by changing the position of the body of the patient. The pelvis should be raised above the level of the shoulders, on a hard cushion, so that the neck of the bladder is raised, and the stone made to roll away from it.

The sound to be employed should not only possess the form which has been indicated, but may also be hollow, so as to admit of the passage of a stream of water through it either inwards or outwards as may be required. If so, there should be a plug or stop-cock at the handle, the opening in the latter being adapted to fit the nozzle of an injecting instrument.

The sound having been introduced into the bladder when it is neither distended nor empty, but holding only a small quantity of urine, the search may be conducted by passing the beak laterally from the prostate to the upper part of the bladder, first on one side, then on the other. The instrument, having been directed through the upper fundus and back part, is now conducted to the depression behind the prostate. Withdrawing it until the beak arrives as near to the neck of the bladder as the tumour permits, the handle is slowly depressed between the patient's thighs, so that it can be fairly rotated, and its beak turned downwards towards the rectum. It is then moved gently to the right and left, backwards and forwards, during which it will probably be felt to glide lightly over some projecting muscular columns, if the bladder be fasciculated. At this point, if nothing is found, the patient's pelvis may be elevated in order to dislodge the suspected calculus from behind the prostate, and move it into the body, or towards the upper part of the bladder. Nothing being still discovered, the patient may be placed in the upright posture, or he may be partially seated, while the water is permitted to flow through the sound; during which it sometimes happens that the stone is brought down against the sound, or that the relations of parts are in some way altered, so as to permit a stone to be felt which had hitherto escaped detection. This manœuvre, however, can scarcely be required by any practised hand after fair search by the ordinary methods. In cases of doubt, a lithotrite of moderate size offers some advantages as a sound. The ability to open the blades a little presents a fresh mode of searching, and enables the operator to sweep a larger field in the distended bladder, adding to the chance of detecting small stones or fragments. Civiale sometimes employed a lithotrite, of which the male blade contains a channel, so as to permit water either to be injected through it, or to escape, during its employment in the bladder, whether for sounding or for crushing the stone; but this is a refinement which I have never known to be necessary.

The presence of calculus having been verified, the mode of removing it comes next under consideration.

Enlargement of the prostate is doubtless a source of some difficulty in the performance both of lithotomy and lithotrity.

In lateral lithotomy it prevents, if very large, the finger from reaching the bladder, and determining the situation of the stone, renders the application of the forceps more uncertain, and the seizing and extraction of the stone more difficult. The distance from the surface of the perineum to the vesical cavity is increased in proportion to the degree of enlargement. The prostatic urethra, as we have seen, may be lengthened from one and a half inch to three inches, or even a little more, and beyond this there may be a tumour projecting, over which any instrument must be carried before the calculus, which lies deeply behind it, can be reached. In any case of notable enlargement the finger can barely reach the bladder or touch the stone, so as to verify or influence its position. Again, the depth of the wound limits the motion of the forceps considerably; it is not merely necessary to seize the object without the assistance of the finger, but the range of movements possible to the instrument is circumscribed—indeed, in some rare cases it would scarcely be practicable to obtain contact with the calculus, unless the blades were specially curved to enable the operator to search behind the prostate for it. On the same ground, the extraction is more difficult; an increased length of passage requires a proportionate augmentation of diameter, in other words, a more extended use of the knife, to permit a facility for extraction equal to that enjoyed in ordinary cases.

In lithotrity, the enlarged prostate affords an obstacle more or less considerable to the easy introduction of the instrument, and sometimes causes a little more delay in seizing the stone; but these are difficulties of small importance. Careful management of the lithotrite will overcome any obstruction met with in traversing the urethra, even when considerably deviating from the normal direction and length; or in dealing with the calculus in the bladder itself. This subject is discussed at length in my work on Lithotomy and Lithotrity.

But it is impossible now to sustain any serious objection to lithotrity in cases of enlarged prostate on the ground of unusual risk or difficulty in performing the operation. On the contrary, the operation is usually a safer and more certainly successful proceeding than in the healthy bladder of the young or middle-aged patient, since the organ is often capacious, and the urethra has mostly become thoroughly accustomed to contact with instruments.

Formerly the chief objection to the operation arose from difficulty in passing the large and clumsy lithotrites at first used, through the neck of a bladder much deformed by prostatic growths, and of manipulating them in the interior of the viscus for the same reason.

Another objection was the inability of the bladder to expel débris made in crushing, when all expelling power had been lost. Clover met the latter difficulty with his aspirator, designing it for me originally with this object especially in view. The former difficulty has been effectually met by the much lighter and more manageable lithotrites, such as those I have advocated from the first, and which are now almost universally used, at any rate in Europe. These objections have now, therefore, entirely disappeared. And Bigelow's method of removing the whole calculus, whatever its size, at one sitting, is as applicable and successful with prostatic patients as in all other cases of lithotrity.

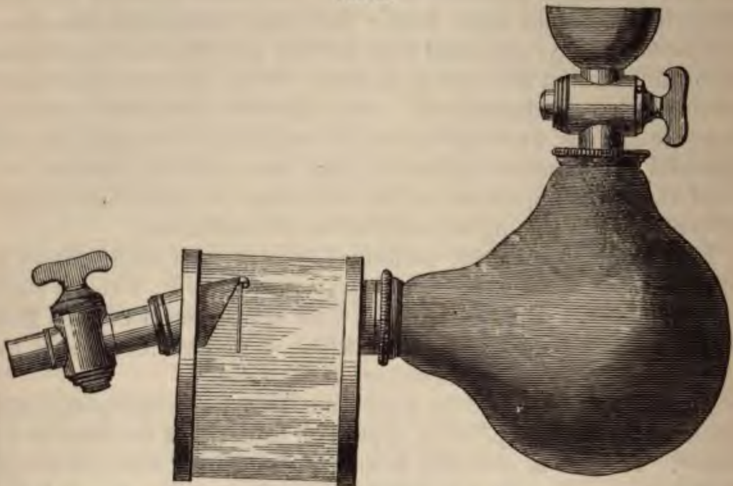
Of the modern operation as thus understood, my experience enables me to speak with the highest satisfaction and confidence.

I have now (April 1886) performed lithotrity at a single sitting in 242 adult cases of calculus. The mean age of these is, within a slight fraction, 62 years, and among them were only seven deaths—a little less than three per cent.: a result which, I may venture to say, has not yet been surpassed in the history of lithotrity.

Of these 242 cases, a great many were the subjects of hypertrophied prostate, and were compelled to depend on catheterism for relief of the bladder. It must be observed, however, that I have made no change in the instruments used, and that the lithotrites were the same which I have employed for the last twelve years or more. The aspirator is more powerful than the original one of Clover formerly used, having been modified by myself to meet the new requirements which have arisen in adopting the method by a single sitting. The form I now employ, with its most recent improvements, is shown at fig. 39. It is extremely serviceable for removing small phosphatic concretions, and phosphatic granular and mortar-like deposits. It may be also occasionally employed for the purpose of removing blood-clots from the bladder (see p. 143).

In regard of the phosphatic concretions and deposits just referred to, which are formed in the bladder—and of course wholly distinct in their nature from the prostatic concretions of which the history has been given (p. 213)—this instrument affords the best method of dealing with them. They are not to be admitted to the rank of vesical calculi, to which the larger and more mature examples belong. Had I so regarded them, the number of my 'stone operations' would be greatly augmented. But after a calculus of some size has been removed from a patient whose prostate compels him to pass all his urine by catheter, the formations in question are very prone to recur, and may be regularly and periodically removed while quite small, thus preventing the re-formation of what might be correctly termed a 'calculus.' Such a patient finds from time to time his symptoms aggravated by the presence of a small phosphatic concretion, weighing perhaps from ten to twenty grains, too large to wash out by the ordinary bottle, but which a single introduction of the lithotrite or aspirator suffices to remove. This proceeding may be repeated sometimes once or twice in a year; and thus, for a single individual, the surgeon may have to repeat the process six, eight, or even ten times, maintaining him thus in a condition of safety and tolerable comfort.

FIG. 39.



The author's aspirator, with most recent improvements, valve, &c.; for removing débris, concretions, and clots from the bladder.

There are some cases, perhaps, in which it may be possible to obtain assistance from the injection of solvents into the bladder.

It has been already stated that many of the formations met with in the bladder in connection with enlarged prostate are phosphatic in their character. And these are also the most susceptible to the influence of chemical agents, not only on account of their own chemical constitution, but on the ground of the state of physical aggregation which they usually affect.

So greatly, however, has the mechanical process of removing calculous matter in any form been improved, that there are very few instances in which the use of solvents can be necessary as a substitute for an operation. As a means of preventing the occurrence of concretion, that is, of dissolving the earthy deposits in the earliest stage of formation, solvents play an important part in the matter of treatment. Sir B. Brodie employed weak solutions of nitric acid to dissolve small phosphatic concretions, and was successful in two cases, which he reported at length. After that the effect of weak solutions of acetate of lead was found to be still more considerable upon these bodies, and excited at the time (1830-40) much interest. I found by experiment that one grain to three ounces of distilled water was the strongest solution which could be employed for the purpose without irritating the bladder. This is, I believe, still the most efficient agent in preventing the appearance of phosphatic deposits in those who are subject to their occurrence. It should be injected once or twice daily—say four ounces at a time, leaving one to two ounces in the bladder on each occasion. Although this treatment controls the tendency to produce phosphatic deposit, it cannot be said always to prevent it, and the re-formation of such concretions will take place in some patients, whatever local or general treatment is adopted. Indeed, no general treatment, no regimen and diet exert any influence on the bladder in relation to its tendency to secrete or deposit phosphatic salts.

One of the best applications to the lining membrane of the organ, as a corrective of this tendency, is a solution of nitrate of silver. The injection of this, in most cases once a day only, acts more powerfully than any other agent to diminish the quantity of muco-purulent secretion, and prevent the production of the phosphates. The solution should never exceed in strength, at first, half a grain of the nitrate to four ounces of distilled water. For further particulars respecting this and other solutions, together with the mode of using them, see page 140.

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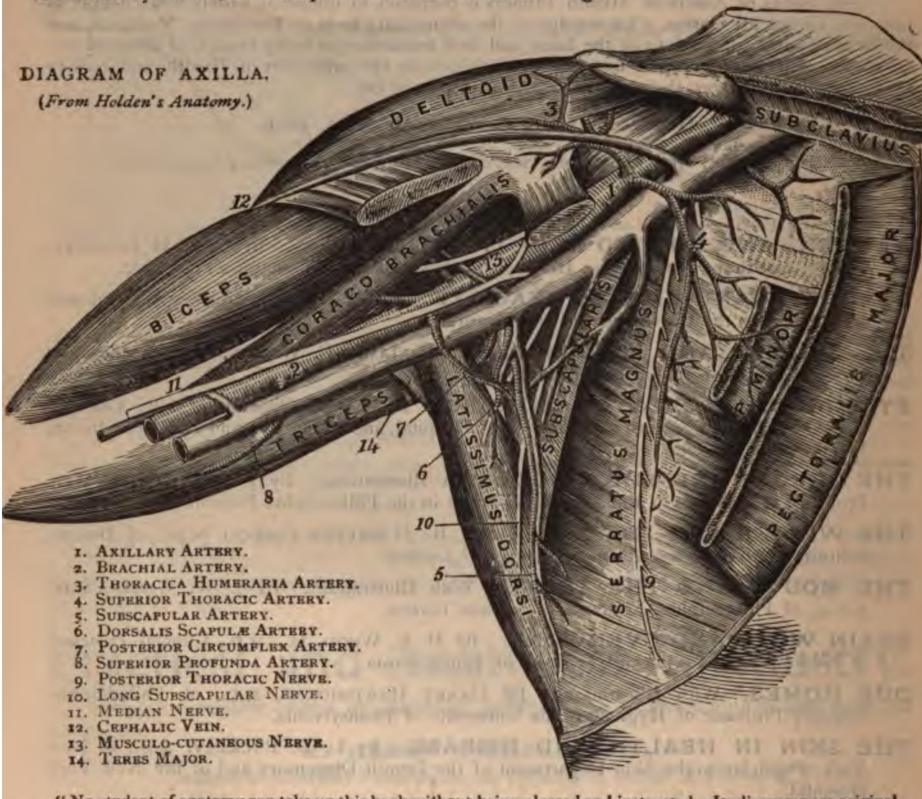

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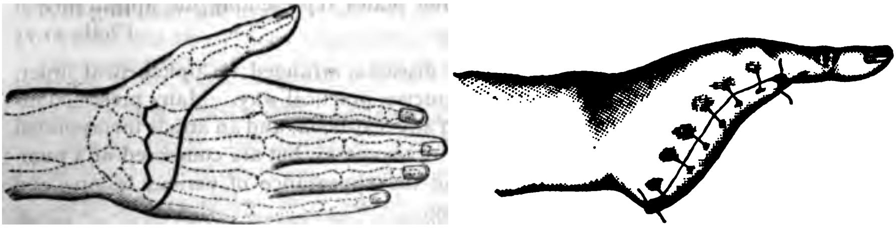

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